[Part 3. Reprinted 1959]

IMPERIAL MYCOLOGICAL INSTITUTE

REVIEW

OF

APPLIED MYCOLOGY

VOL. XIII MARCH 1934

ESAU (KATHERINE). **Pathologic changes in the anatomy of leaves of the Sugar Beet, Beta vulgaris, affected by the curly-top disease.**—*Phytopath.*, xxiii, 9, pp. 679–712, 10 figs., 1933.

A comprehensive account is given of the writer's studies at the California College of Agriculture on the anatomical changes induced in sugar beets by curly top [*R.A.M.*, xii, p. 748]. The modifications observed included hypertrophy, hyperplasia, hypoplasia, and necrosis, the last-named being limited to the phloem and pericycle and being found in the leaves, stems, and roots. Leaves developing after infection are usually stunted and show other symptoms of curly top, root growth is retarded, and numerous laterals are produced.

Probably the degeneration first observed in the phloem and pericycle is the primary effect of the disease, resulting from the actual presence of the insect-borne virus in the tissues, whereas the subsequent hypertrophy and hyperplasia in the phloem and mesophyll and the general stunting of the plant may be interpreted as secondary consequences associated with nutritional disturbances. The first stage of phloem alteration appears to be hypertrophy or division of the cells, some of which then collapse, leading in the older leaves to the formation of conspicuous cavities, surrounded by a thin-walled, callus-like tissue. The stimulation to growth and cell division in the vicinity of the necrotic lesions are reminiscent of wound-healing reactions; in such proliferations the phloem parenchyma, starch sheath, and cortical parenchyma participate. In heavily infected sugar beet leaves secondary xylem elements frequently appear in the hyperplastic callus-like tissue occupying the position of the degenerated bundle cap (pericycle). Even in healthy beets there is normally a formation of secondary and tertiary cambiums in the phloem and pericycle of the roots and flowering stalks and to a more limited extent in the leaves, these cambiums cutting off xylem and phloem just as the primary cambium does. In the diseased plants, however, the new xylem may appear without any cambium, or a few cells may show an irregular cambium formation first, and the abnormally formed xylem derived from this is without fibres, having merely radial rows of spiral, scalariform, or reticulate vessels. No connexion could be traced in transverse and longitudinal sections of diseased leaves between the normal xylem and that developed in the hyperplastic tissue. The cells of the new tissue contain only a few

small, pale, irregularly shaped chloroplasts, a degenerative change to which the 'clearing' of the veins may be attributed. In the later stages of curly top the hypertrophy and hyperplasia of the cortical tissue lead to thickening and distortion of the veins and to a formation of protuberances [ibid., viii, p. 694], while the hypertrophy of the mesophyll more distant from the phloem may cause thickening of the leaves.

A three-page bibliography is appended.

DRAKE (C. J.), TATE (H. D.), & HARRIS (H. M.). **The relationship of aphids to the transmission of yellow dwarf of Onions.**—*Journ. Econ. Entom.*, xxvi, 4, pp. 841–846, 1 graph, 1933.

The infective principle of yellow dwarf of onions [*R.A.M.*, xi, p. 760] was found, in the writers' experiments in Iowa, to be taken up by the aphid vectors (over 50 distinct species of which have proved capable of transmitting the disease) during their first feeding on diseased plants, from which it is immediately transmissible to healthy ones. On the third or fourth day after inoculation by viruliferous aphids, the growing onion becomes a source of infection and harbours the virus throughout life, though the symptoms of the disease may be masked. The infective principle, once established, becomes systemic in the plant and may persist for long periods in the dormant bulb, which appears to be the only source of overwintering of the virus. In the insect, on the other hand, the virus quickly loses its infectious character.

In 1932 *Macrosiphum pisi* was the first aphid observed feeding on onions in the Pleasant Valley (10th May); three days later the average population of this species in fields bordering lucerne was 2,500 per acre. On and after the 20th the bean aphid (*Aphis rumicis*) was common, accompanied by *A. helianthi*, *Hyalopterus atriplicis*, and other species. During the latter part of July, both in 1931 and 1932, the melon aphid (*A. gossypii*) was the most prevalent species in many onion fields, while after harvest the apple grain aphid (*Rhopalosiphum prunifoliae*) predominated and was largely responsible for the spread of the disease among volunteer onions in the autumn.

A list is given of the species of aphids which were shown to be able to act as vectors of yellow dwarf in field and greenhouse experiments, including (besides those already mentioned) *Amphorophora rubi*, *Aphis laburni*, *A. pomi*, *Brevicoryne brassicae*, *M. gei*, *Myzus cerasi*, and *M. persicae*. No transmission was effected by insects that gnaw the leaves.

WALKER (M. N.). **Occurrence of Watermelon mosaic.**—*Phytopath.*, xxiii, 9, pp. 741–744, 2 figs., 1933.

In April, 1932, Tom Watson watermelon plants in Polk County, Florida, were observed to show conspicuous symptoms of mosaic, including stunting, crowding, and mottling of the leaves, sometimes accompanied by severe malformations, various abnormalities of the floral parts, and mottling and distortion of the fruits. In extreme cases the latter failed to develop, owing to the necrosis and shedding of the blossoms before maturity. The affected plants presented a general 'petunia-like' appearance, due to the protrusion

of the runner tips and proliferation of the shoots round the crowns above the general level of the vines. Subsequent observations showed that the disease spread from the first-infected plants, but the agent of transmission has not been determined. *Aphis gossypii* was unusually abundant at the time of the infection and may be a vector.

This is apparently the first record of the spontaneous occurrence of mosaic on watermelons, though they and certain watermelon-citron crosses have been artificially inoculated with cucumber mosaic [*R.A.M.*, xi, p. 558].

CIFERRI (R.). **Le malattie della Manioca (Manihot esculenta Crantz) in San Domingo. I. Notizie sull' ambiente in cui si effettuarono gli studi. II. La malattia delle macchie fogliari circolari (Helminthosporium hispaniolae Cif.).** [The diseases of Cassava (*Manihot esculenta* Crantz) in San Domingo. I. Notes on the environmental conditions in which the investigations were conducted. II. The circular leaf spot disease (*Helminthosporium hispaniolae* Cif.).]—*Boll. R. Staz. Pat. Veg.*, N.S., xiii, 2, pp. 227–240, 4 pl., 1 graph; pp. 241–308, 7 pl., 5 figs., 6 graphs, 1933. [English summaries.]

After briefly reviewing the environmental factors influencing the cultivation of cassava (*Manihot esculenta*) [*M. utilissima*] in the Dominican Republic the author gives a full account of a leaf spot (followed under certain conditions by rapid defoliation, from which, however, the plants speedily recover) of this host first observed locally in January, 1930; since then, the disease, which is not of primary importance economically, has spread and become endemic, rare in dry weather but widely prevalent in wet. Varieties with violet or brownish colouring in the young leaves are somewhat resistant.

The affected leaves show faint greenish, later brown, circular, isolated or sub-confluent spots surrounded by a delicate, dark brown halo and measuring 1 to 8 (usually 4) mm. in diameter. The spots bear blackish, erumpent, pulvinate tufts of short, thickly aggregated, sub-hyaline to light grey, continuous or 1-septate conidiophores, each of which bears one acrogenous, sub-hyaline to smoky-grey, elongated-cylindrical to ellipsoidal, straight or slightly curved, 1- to 8-, usually 3-, septate conidium with a flat base and a pointed apex, measuring 14 to 41·8 (usually 33·3) by 7·4 to 14·8 (usually 11·1) μ.

The fungus (the pathogenicity of which was established) is named *Helminthosporium hispaniolae* Cif. n. sp. It resembles an *Exosporium* in its characters on the leaf, but is not to be distinguished from *Helminthosporium* in cultural characters [full details of which are given]. The optimum temperature for infection was found to be 42° C., but rainfall is the most important factor in determining the size of the spots.

MAHOUX (J.). **Le sulfatage avec bouteilles d'air comprimé.** [Spraying with cylinders of compressed air.]—*Prog. Agric. et Vitic.*, xcix, 22, pp. 519–522, 1933.

The author states that considerable progress has been achieved

in south-west France in developing the method, introduced there in 1929, of spraying the vines with the help of compressed air which is delivered by regional agricultural co-operative societies to the growers in 8·33 l. cylinders under a pressure of 150 atmospheres, at a cost of 1·25 to 3·75 francs per cylinder. In practice this method, which involves some slight modifications to the sprayers in general use, has proved to be very successful, inasmuch as it ensures a regularity in the distribution of the spray liquid difficult to attain in hand-worked or traction air-compressing apparatus, considerably reduces the time required for the refilling of the sprayers, and increases the rapidity of the work. A further improvement has been realized by a manufacturer in Nîmes, who devised a sprayer carried on horseback, in which the residual pressure remaining in the apparatus after spraying is used to refill it with a minimum expenditure of time and without the help of auxiliary filling pumps. This apparatus, known under the name 'Compound', is of a capacity of 100 l., and was shown in practice to be able to spray 5 hect. of vines in a day, at the rate of 1,000 l. spray liquid per hect., thus ensuring the drenching of the vines with the spray liquid recommended by Ravaz for the control of downy mildew [*Plasmopara viticola*]. Under local conditions the installation cost of the air-compressing outfit is stated to be comparatively inexpensive—a first outlay of 13,000 to 18,000 francs being considered sufficient for the installation of a plant capable of serving an area of some 500 hect. of vineyards.

RAVAZ (L.). **Chronique. Au vignoble. Le black-rot.** [Current events. In the vineyard. Black rot.]—*Prog. Agric. et Vitic.*, c, 29, pp. 53–55, 1933.

A fairly severe outbreak of black rot [*Guignardia bidwellii*] on the leaves of the vine in central France, which occurred late in the spring of 1933 following frequent slight rains with high day temperatures, gives occasion to the author to recommend the drenching of the developing grape bunches with a wetting cupric spray, since these organs are those that suffer most from the attacks of the fungus. The disease does very little injury to the vine leaves and wood.

RAVAZ (L.). **Chronique. L'anthracnose sur producteurs directs.** [Current events. Anthracnose on ungrafted Vines.]—*Prog. Agric. et Vitic.*, xcix, 26, pp. 613–615, 1933.

The author points out that the practical suppression of vine anthracnose [*Gloeosporium ampelophagum*: *R.A.M.*, xii, p. 6] in France has been chiefly brought about by the systematic spraying of the vineyards with Bordeaux mixture against mildew [*Plasmopara viticola*], since both diseases are amenable to control by this preparation. In wet years, however, American varieties of the vine and certain American hybrids which are cultivated without grafting are fairly severely attacked by anthracnose, this being ascribed to the fact that they are not sprayed owing to their high resistance to, or immunity from, mildew. It is recommended, therefore, that vines liable to severe anthracnose injury should be

included in the general spraying schedule with Bordeaux mixture, and that the stocks should be sprayed in the winter, a few days after pruning, with a 35 per cent. iron sulphate solution, to which 1 l. sulphuric acid [per 100 l. solution] is added.

CIFERRI (R.). **La 'necrosi' degli acini d'Uva.** [Necrosis of Grape berries.]—*Giorn. di Agric. della Domenica*, xliii, 37, p. 358, 3 figs., 1933.

Vines in France and Italy are liable to a condition, the cause of which remains obscure, which produces a necrosis of the berries hitherto probably confused with attack by *Oidium* [*Uncinula necator*]. A few half-developed berries on a few bunches are attacked simultaneously, while the very small and the ripe berries remain unaffected.

The first symptom is the appearance of a livid, indefinitely shaped spot on the side of the berry; at this point the tissues collapse and the surface becomes flattened, as if pressed with the thumb, this characteristic accounting for the French name for the condition, 'coup de pouce'. After a few days, the spot turns brown, and the depression of the surface becomes marked. The bunch may wilt as a whole and longitudinal cracks appear in the fruit, laying the seeds bare.

It is generally agreed that the condition is due to physiological causes associated with weather conditions (especially dry, windy summers) or internal functional disturbances. Affected but unbroken berries show no sign of fungal attack.

In the author's opinion, the condition, which requires further investigation, is a form of sunstroke due to a number of factors varying in their manifestations and importance but all associated with weather conditions.

Rapport sur le fonctionnement de l'Institut des Recherches Agronomiques pendant l'année 1932.—489 pp., 6 graphs, 1933.

In 1932, warnings against impending attacks of vine diseases [chiefly *Plasmopara viticola*, *Uncinula necator*, and *Guignardia bidwellii*] were issued by the Bordeaux climatological station to 1,236 subscribers, as compared with 1,202 in 1930 and 1,425 in 1931. At Clermond-Ferrand similar warnings against vine downy mildew [*P. viticola*] and *Oidium* [*U. necator*], potato late blight [*Phytophthora infestans*], and apple diseases [chiefly *Venturia inaequalis*] were issued to 525 subscribers, as against only 225 in 1931.

Between the beginning of April and the end of August, 1932, nineteen waves of attack by *P. viticola* occurred on the vines in the south of France, this record figure being largely due to heavy, frequent rains in spring. On each occasion infection became widespread one week after the initial attack. The part played by dew, mists, and nocturnal rain in favouring infection is briefly discussed, and a simple technique for predicting the date of a first attack, based on a method for observing the germination of the oospores in the spring, under as natural conditions as possible, is

described. However, in a paper read by Moreau and Vinet at Angers in June, 1932, before the directors of the French oenological stations, they stated that twenty years' observations in one local vineyard had shown the development of *P. viticola* to be so dependent on transient conditions that accurately to predict an outbreak any length of time beforehand is practically impossible; as a precautionary measure against infection of the bunches the authors always give two copious applications (with an interval of ten days and at a time when the berries can be easily reached) of a cupric lead arsenate mixture whatever the prevailing weather during the previous and current year.

Notes are also given on diseases of wheat [*R.A.M.*, xii, pp. 490, 682], potato, tobacco, hops, fruit trees, walnut, chestnut, and market-garden crops [ibid., xii, pp. 489, 491; xiii, p. 76], and numerous French, German, English, American, Dutch, and Polish potato varieties found after three years' trials to be resistant to *Synchytrium endobioticum* are listed.

The elm disease due to *Graphium* [*Ceratostomella*] *ulmi* [ibid., xiii, p. 64] is now widely distributed in France; the fungus was isolated from elms bordering roads in Alsace, where the disease is stated to have been present in 1920.

In a test of varietal resistance to poplar canker [ibid., xii, p. 127] the variety of poplar grown in the valley of the Ourcq showed the fewest lesions, whereas *Populus generosa* developed a rapid and serious attack on the trunk.

Pollacci (G.). **Rassegna sull'attività del Laboratorio Crittogamico di Pavia (Osservatorio Fitopatologico per le provincie di Cremona, Parma, Pavia e Piacenza) durante l'anno 1932.** [Report on the activity of the Cryptogamic Laboratory of Pavia (Phytopathological Observatory for the provinces of Cremona, Parma, Pavia and Piacenza) during the year 1932.]—*Atti Ist. Bot. R. Univ. di Pavia*, Ser. IV, iv, pp. 3–23, 1933.

This account of the work done at the Cryptogamic Laboratory, Pavia, in 1932 [cf. *R.A.M.*, xii, p. 200] includes a number of items of phytopathological interest, of which the following may be cited. Very severe damage was caused to fruit trees, especially apricots, plums, and (to a less extent) peaches by tracheomycosis [*Verticillium* sp.: ibid., x, p. 150]. Varieties recently introduced suffered most, the only apricot variety remaining unaffected in lower Lombardy, for example, being the old local one.

Die-back of elms (*Graphium* [*Ceratostomella*] *ulmi*) is becoming more and more widespread in Italy [ibid., xii, p. 734], especially in the vicinity of Piacenza and Parma, where many thousands of trees have died. In the attempt to discover a resistant variety hundreds of *Ulmus pumila* trees have been distributed to growers; after being inoculated with *C. ulmi* young *U. pumila* trees grew well, infection being limited in extent.

The canker of Canadian poplar [*Populus canadensis*] caused by *Dothichiza populea* [ibid., xi, p. 338] is present, but does not cause much damage, in the vicinity of Pavia.

The paper concludes with a 12-page list of the plant diseases

identified during the year, the hosts being arranged in groups and the causal organism of the parasitic diseases indicated in each case.

Plantesygdommer i Danmark 1932. Oversigt, samlet ved Statens plantepatologiske Forsøg. [Plant diseases in Denmark in 1932. Survey of data collected by the State Phytopathological Experiment Station.]—*Tidsskr. for Planteavl*, xxxix, 3, pp. 453–506, 3 figs., 2 graphs, 1933. [English summary.]

This report, compiled by E. Gram and his collaborators on the usual lines [*R.A.M.*, xi, p. 767], contains a list showing the number of inquiries received concerning each disease, arranged under the different crops. The following are new records for Denmark. Mosaic diseases were observed on different varieties of outdoor primulas at Lyngby, and were reported from various places on swedes, elder (*Sambucus*) [*nigra*], *Callistephus*, chrysanthemum, peony, and phlox.

Beans [*Phaseolus vulgaris*] in the Copenhagen district were attacked by both *Phytomonas viridiflava* var. *concentrica* and *P.* [*Bacterium*] *medicaginis* var. *phaseolicola* [ibid., xii, p. 348].

Phoma roseola was found on poorly germinating seedlings of snail's medick [*Medicago scutellata*], the germination of which was improved by dusting the seed with sanagran T or one hour's immersion in 0·25 per cent. uspulun.

Forty-sixth Annual Report of the Colorado Agricultural Experiment Station for the fiscal year 1932–33.—24 pp., 1933.

The following items of phytopathological interest occur in this report, which covers the period from 1st July, 1932, to 30th June, 1933. On the Experiment Station plots, all of which are thoroughly infested by the lucerne wilt organism, *Aplanobacter insidiosum* [*R.A.M.*, xii, p. 615], all the reputedly resistant varieties of whatever origin [ibid., xii, p. 336] were killed in susceptibility trials. Of those grown in adjacent counties on selected farms, Ladak was shown to be the most resistant. The sole practice enabling the stand to be carried on was that of omitting the third cutting, which resulted in an annual reduction of yield amounting to about 0·75 ton, but saved the crops where other measures failed to do so.

Extensive field and greenhouse studies are considered to lend no support to the virus theory of the etiology of psyllid yellows of potatoes [ibid., xiii, p. 119]. Investigations were further carried out on the control of purple blotch of onions [ibid., x, p. 87] by spraying, and on a *Fusarium* neck rot of stored onions, collar rot of tomatoes (*Alternaria solani*) [ibid., xiii, p. 65, and below, p. 195], and carnation wilt (*F. dianthi*) [ibid., xiii, p. 31].

GHEORGHIU (I.). **Le cancer des plantes et l'immunité anticancéreuse.** [Plant cancer and anticancerous immunity.]—*Ann. Inst. Pasteur*, li, 4, pp. 535–544, 1 col. pl., 4 figs., 1933.

The essential information in this extended account of the writer's studies on the immunization of *Pelargonium zonale* against crown gall (*Bacterium tumefaciens*) in Rumania has already been noticed from another source [*R.A.M.*, xii, p. 496].

CHESTER (K. S.). **Studies on bacteriophage in relation to phytopathogenic bacteria.**—*Zentralbl. für Bakt.*, Ab. 2, lxxxix, 1–4, pp. 1–30, 1933.

A comprehensive, tabulated account is given of the writer's studies on the bacteriophage phenomenon in relation to crown gall (*Bacterium tumefaciens*) of *Pelargonium zonale* [*R.A.M.*, xiii, p. 16] and beet [ibid., x, pp. 285, 779]. A critical examination of the technique of bacteriophage investigation in connexion with phytopathogenic bacteria led to the development of a satisfactory standard procedure [full details of which are given].

In 60 tests on *P. zonale* stems bacteriophage was isolated from 40 per cent. of the crown galls produced by inoculation with a strain already containing a weak bacteriophage, from 30 per cent. of the adjacent healthy tissues, and from none of the sound, non-infected plants. In corresponding experiments with beetroot, bacteriophage was isolated from 75 per cent. of the galls, from 40 per cent. of the surrounding tissues, and from 30 per cent. of the non-infected plants. The *Pelargonium* tests show that the bacteriophage is able to diffuse outwards from the site of infection into the surrounding healthy tissues, while those with beet afford additional evidence that bacteriophage from the soil can penetrate the healthy root tissues. Although the distance thus traversed by the bacteriophage was only a few centimetres at the most, the possibility of explaining, by its prophylactic value in healthy plant tissues, such results as those reported by Arnaudi in the vaccination of plants against crown gall [ibid., viii, p. 116], must be taken into account.

SĂVULESCU (T.). **Beiträge zur Kenntnis der Biologie der Puccinia-Arten, die den Weizen in Rumänien befallen.** [Contributions to the knowledge of the biology of the *Puccinia* species attacking Wheat in Rumania.]—*Zeitschr. für Pflanzenkrankh. u. Pflanzenschutz*, xliii, 10, pp. 577–594, 1 graph, 3 maps, 1933.

Both as regards overwintering and their modes of dispersal and infection, the three species of *Puccinia* attacking wheat in Rumania [*R.A.M.*, xii, p. 549] present divergent features. *P. triticina* overwinters in the form of uredospores and resting mycelium arising from autumn infections, and after a relatively mild winter spread of the infection takes place early in the season (April to May) [cf. ibid., xiii, p. 82]. Following very severe winters, however, or in the absence of autumn infections, fresh outbreaks of rust are not observed before June, when they must be attributed to reinfection by uredospores conveyed from a distance by easterly and southerly winds.

P. glumarum [ibid., xiii, p. 18] cannot overwinter in Rumania in the form of uredospores and resting mycelium, so that outbreaks of yellow rust do not usually occur before June, when a fresh contingent of uredospores is borne into the country chiefly by winds from the north and west.

P. graminis never overwinters in Rumania except by teleutospores which infect the numerous barberries in the spring and thence pass to wheat by the end of June or early July at the latest.

There is no connexion, however, between certain sudden epidemics of black rust which have been observed without infection of an alternate host in the spring, and the previous year's attacks, and the former are considered to be, in all probability, the result of new infections by foreign uredo- or aecidiospores carried mainly by the south wind.

Inoculation experiments with the basidiospores of *P. triticina* on nine species of *Thalictrum* gave positive results only on *T. flavum*, *T. aquilegifolium*, *T. bauhini*, and *T. minus*. In no case, however, has spontaneous infection by the aecidial stage of *P. triticina* been observed in Rumania on any species of *Thalictrum*.

FARIS (J. A.), TAPKE (V. F.), & RODENHISER (H. A.). **Wheat smuts and their control.**—*U.S. Dept. of Agric. Farmers' Bull.* 1711, 16 pp., 10 figs., 1 graph, 1933.

A popular account (superseding *Farmers' Bull.* 1540) is given of the symptoms, etiology, distribution, and control of the wheat smuts caused by *Tilletia tritici* and *T. levis* [*T. caries* and *T. foetens*], *Ustilago tritici*, and *Urocystis tritici*.

BLUNCK [H.]. **Die Umstellung im Getreidebau und die Pflanzenkrankheiten. 1. Verarmen der Fruchtfolge und seine Gefahren. 2. Die Fusskrankheiten des Getreides. 3. Getreidemehltau, Gelbrost, Fritfliege und Weizengallmücken.** [The reorganization of cereal cultivation and plant diseases. 1. Diminution of rotation and its dangers. 2. The foot rots of cereals. 3. Cereal mildew, yellow rust, frit fly and Wheat gall midges.]—*Mitt. Deutsch. Landw. Gesellsch.*, xlviii, 13, pp. 262–263; 14, pp. 286–288; 18, pp. 377–378, 6 figs., 3 graphs, 1933.

Attention is drawn to some potential dangers (already becoming apparent in certain quarters) of the campaign for an extension of cereal cultivation in Germany, where the comparatively hardy rye and oat crops, moreover, are being largely replaced by wheat and barley which are far more exacting in their requirements. Inadequate rotation is tending to increase the cereal foot rots of wheat caused by (*Ophiobolus*) [*graminis* and *O. herpotrichus*], *Cercosporella herpotrichoides*, and *Fusarium* spp. [*R.A.M.*, xii, pp. 502, 685; xiii, p. 23, *et passim*], as well as various other diseases. It is estimated that since 1929 the total area under cereals has increased by some 137,000 hect., while in some districts of Schleswig-Holstein in 1933 cereals occupied 75 to 90 per cent. of the land. This had led to overproduction and a serious fall in prices, necessitating considerable economic adjustment.

MORITZ (O.) & BOCKMANN (H.). **Einleitende Studien über Cercosporella herpotrichoides Fron.** [Introductory studies on *Cercosporella herpotrichoides* Fron.]—*Angew. Bot.*, xv, 5, pp. 409–419, 1 fig., 1 graph, 1933.

Cercosporella herpotrichoides, first reported from Germany in 1932 [*R.A.M.*, xii, p. 502], was found to be a fairly regular con-

comitant of lodging on wheat plants in Schleswig-Holstein [see preceding abstract], Saxony, and Pomerania. Inoculation experiments demonstrated the pathogenicity of the fungus to wheat seedlings. The symptoms induced by mixed inoculations with *C. herpotrichoides* and *Fusarium culmorum* were more severe than those obtained with either organism alone. In nature *C. herpotrichoides* was sometimes found accompanied by *Ophiobolus graminis*, *Wojnowicia graminis*, and a number of other organisms [which are listed], but *Leptosphaeria herpotrichoides* was never observed. Conidial formation was most profuse in cultures exposed to fluctuating temperatures (below 0° to 21° C.) and in those with a poor supply of nutriment, e.g., soil agar.

HEMPELMANN & STEININGER. **Beobachtungen über Fusskrankheit an Weizen.** [Observations on foot rot of Wheat.]—*Mitt. Deutsch. Landw.-Gesellsch.*, xlviii, 36, pp. 783–785, 1933.

The writers' observations on the cultural and rotational practices in a number of outbreaks of foot rot of wheat (primarily the black basal form) [associated with *Ophiobolus graminis*: *R.A.M.*, xi, p. 444; xii, p. 19, and preceding abstracts] in Hanover are summarized, tabulated, and discussed. Of all the measures tending to maintain the soil in a healthy condition, crop rotation is the most important. Barley should be absolutely excluded, as wheat suffers more from root rot after this than after any other crop, rye being also detrimental though to a lesser degree. Oats do not definitely predispose the wheat crop to foot rot but are not suitable for rotation with wheat if either barley or rye also occurs in the rotation. Wheat should not be allowed immediately to precede wheat. The incidence of foot rot appears to be increased by the use of fresh stable manure. In certain cases in which the disease developed even where beets or potatoes were grown between barley and wheat, unsuitable soil conditions are considered to have promoted infection.

BENNETT (F. T.). **Gibberella saubinetii (Mont.) Sacc. on British cereals. III. Occurrence under natural conditions.**—*Ann. of Appl. Biol.*, xx, 3, pp. 377–380, 1 graph, 1933.

In 1932, the author observed the perithecial stage of *Gibberella saubinetii* on the ears of Little Joss wheat in Northumberland, this being the first record of the occurrence of this stage under natural conditions in England [*R.A.M.*, x, p. 783]. In 1929, although the summer rainfall and its distribution over the season were approximately the same as in 1932, the perithecia of *G. saubinetii* did not develop outdoors on artificially inoculated wheat and barley, from which the author concludes that the determining factor in their production and maturation in the latter year was the higher mean temperature and occasional very hot days that prevailed.

Single ascospore cultures normally gave only a *Fusarium* growth; the ascigerous type of growth arose only from ascospores developed under abnormal conditions.

Shands (R. G.), Leith (B. D.), Dickson (J. G.), & Shands (H. L.). **Stripe resistance and yield of smooth-awned Barley hybrids.** —*Wisconsin Agric. Exper. Stat. Res. Bull.* 116, 22 pp., 2 figs., 3 graphs, 1 map, 1933.

A detailed study [the results of which are fully discussed and tabulated] showed a wide variation in reaction to stripe disease (*Helminthosporium gramineum*) among the economically important selections from a cross between the rough-awned Pedigree Oderbrucker barley (*Hordeum vulgare* var. *pallidum typica*) and a small, black, smooth-awned type (var. *nigrum leiorrhynchum*). Amongst the progeny, several of a group termed X 39 were distributed as pedigree lines. One of these, termed Wisconsin Pedigree 38 or Wisconsin Barbless, has consistently proved superior in yield and stripe resistance to the Oderbrucker which was previously the standard variety in Wisconsin, and is now reported to have almost displaced other barley varieties in the State. The selections were tested for stripe resistance in a number of different localities, chosen because of the prevalence of the disease in them. When any of the X 39 and X 57 selections were crossed back to the Oderbrucker parents, the susceptibility to stripe was augmented. Selections from such back-crosses closely approximated to the Oderbrucker type in appearance and ranged in stripe reaction from moderate resistance to susceptibility almost equal to that of the susceptible parents. The stripe reaction appears to be correlated with environment during the flowering and seedling stages of the host, and this relationship, which is complex, requires extended study. A given line fluctuates widely in stripe infection and development under different external conditions, while conversely, the same environment seems to act dissimilarly on the occurrence of stripe in the various selections.

Petersen (E. J.). **Havrebakterioser, foraarsaget af Phytomonas coronafaciens.** [Oat bacterioses caused by *Phytomonas coronafaciens*.]—*Tidsskr. for Planteavl*, xxxix, 3, pp. 507–523, 2 pl., 1933.

Oat leaves of the Borris Stand variety submitted to the State Experiment Station at Studsgaard for examination in the summer of 1932, were found to bear oval, greyish, or brownish spots, 1 to 2 mm. in diameter, surrounded by a characteristic green to yellow halo, edged in the more pronounced lesions by a darker brown or purplish ring. In cases of very severe infection the dark outer circles of the halo impart a brownish aspect to the leaf, while the paler central portions often expand and unite to form elongated stripes or irregular islets in which the original points of infection are marked by a darker colour. Leaves thus affected show a general tendency to wilt, often accompanied by curling of the tips.

In the parenchyma cells of the diseased areas rod-shaped, flagellate bacteria, 1·2 to 3·4 μ in length (average 2·2 by 0·6 μ), were found. The organism is Gram-negative, non-acid-fast, liquefying gelatine and peptonizing milk; forming flat, grey colonies on various nutrient media, with minimum, optimum, and maximum temperatures for growth on Difco meat-peptone-bouillon and 1 per cent. dextrose agar at under 6°, 25°, and about 40° C., respectively,

thermal death point 45°; strictly aerobic; developing at a hydrogen-ion range of P_H 5·8 to 8·2, optimum P_H 6·3 to 6·9; making good growth in Fermi's solution with distinct fluorescence, but none in Uschinsky's; utilizing dextrose, levulose, saccharose, maltose, lactose, and mannite, with acid formation on the first three; not reducing nitrates or forming diastase or indol. The index number of the organism (American Society of Bacteriologists) is 5020–31101–0202.

The taxonomy of the pathogen is discussed in relation to the previously reported agents of oat bacteriosis, viz., *Pseudomonas avenae*, *Bacillus avenae* [*R.A.M.*, x, p. 10], *Bacterium coronafaciens* [ibid., vi, p. 272; vii, p. 562; viii, p. 359], and *Bact. striafaciens* (*Journ. Agric. Res.*, xxxv, p. 811, 1927), and the conclusion reached that it corresponds with the causal organism of halo blight, *Bact. coronafaciens*. 'Spot bacteriosis of oats' is the suggested common name for the disease.

After a year in pure culture the pathogen underwent no loss of virulence. Inoculation experiments on eight other varieties of oats besides Borris Stand gave little or no indication of differences in susceptibility. The first spots appeared four to eight days after inoculation and within two to four weeks the leaves assumed a uniform pallor and finally wilted. Under field conditions, however, Borris Stand seems to be the only susceptible variety. The organism was readily conveyed from one part to another by the daily watering, and there was also evidence that it can be transferred from one plant to another by contact.

Apparently the only other record of *Bact. coronafaciens* in Europe is that furnished by Miss Sampson and D. W. Davies from Wales [*R.A.M.*, ii, p. 401; xi, p. 295].

STANTON (T. R.) & MURPHY (H. C.). **Oat varieties highly resistant to crown rust and their probable agronomic value.**—*Journ. Amer. Soc. Agron.*, xxv, 10, pp. 674–683, 1933.

The writers report and tabulate the available information on the origin, introduction, nomenclature, and probable agronomic value of some new varieties of oats with a high degree of resistance to crown rust (*Puccinia coronata avenae*) [*P. lolii*].

Bond (C. I. 2733), an Australian hybrid between the Algerian *A. sterilis* and Golden Rain with the characters of *Avena byzantina*, was found to be outstanding both as regards resistance to crown rust and desirable agricultural features. Kareela (C. I. 2774), an Australian selection from Fulghum of similar type to the foregoing, proved highly resistant in the natural epiphytotics of 1931 in Iowa and Kansas, and in the former State in 1932, but showed complete susceptibility to the rust in Georgia in 1932. The two Victoria strains (C. I. 2401 and 2764) gave marked evidence of resistance to 32 physiologic forms of *P. lolii* collected in the United States, Canada, and Mexico from 1927 to 1931, inclusive [*R.A.M.*, ix, p. 771]. Other new varieties of considerable promise are Capa (C. I. 2765 and 2860), Pampa (C. I. 2767), Alber (C. I. 2776), Criolla (C. I. 2862), Red Algerian (C. I. 2861 and 2867), and Berger (C. I. 2926).

In 1932 Bond produced good yields at five stations; Kareela has

given satisfactory results only from spring sowings, while Alber equalled the yields of the best Red Rustproof strains in autumn sowings in south Georgia in 1931–2. Generally speaking, the Victoria and Capa strains are low yielders, and altogether the chief value of the rust-resistant varieties will probably be for hybridization purposes.

YOUNG (V. H.) & MCCLELLAND (C. K.). **Control of Oat smut.**—*Phytopath.*, xxiii, 10, pp. 825–830, 1933.

Complete control of loose and covered smuts of oats [*Ustilago avenae* and *U. kolleri*] was secured both in 1931 and 1932 in Arkansas by Du Bay dust 952 C (active principle 1 per cent. ethyl mercury tartrate), ceresan, and corona oat dust [*R.A.M.*, xi, p. 634]. Good results were also given in both years by Du Bay 500 LL (1 per cent. ethyl mercury arsenate) and in the second by Du Bay 1134 (2·5 per cent. ethyl mercury phosphate) at the rate of 1 oz. per bushel. The results of treatment with 10 per cent. solution of iodine in carbon bisulphide ($\frac{1}{2}$ oz. per bushel) were much less satisfactory in 1932 than in the previous year [ibid., xii, p. 12].

RAINIO (A. J.). **Punahome Fusarium roseum Link—Gibberella saubinetii (Mont.) Sacc. ja sen Aiheuttamat myrkytykset kaurassa.** [*Fusarium roseum* Link—*Gibberella saubinetii* (Mont.) Sacc. on Oats and the poisoning induced thereby.]—*Valtion Maatolouskoetoiminnan Julkaisuja* 50, 45 pp., 6 figs., 1 map, 1932. [Finnish, with German summary. Received January, 1934.]

In the winter of 1931 the writer examined samples of oats that had either been rejected by stock or caused digestive disturbances. Similar cases are stated to have occurred in various parts of Finland since 1924. Among the fungi detected on the material was *Fusarium roseum*, cultures from the conidia or mycelium of which on oatmeal agar, potato plugs, or oat grains developed the typical sporodochia, perithecia, asci, and ascospores of *Gibberella saubinetii* [*R.A.M.*, x, p. 651, and above, p. 154]. The cultural characters of the fungus also fully agreed with those of *G. saubinetii*.

The quantitative determination of the amount of infection present in a given sample was found to be much more reliable when based on germination tests than when calculated from the number of conidia found in washings from the grain or from the number of visibly attacked grains. The germination tests were made on damp sand in the dark at a temperature of 10° to 12° C. The fungus occurs on some of the grains exclusively in the mycelial form, barely distinguishable on dry material.

Oats infected by *G. saubinetii* were rejected by horses, or eaten reluctantly with consequent digestive disorders, when the infection exceeded 20 per cent. of the grains; between 10 and 20 per cent. the food was unpalatable, but below 10 per cent. no ill effects were observed. Cattle showed no loss of appetite unless the infection exceeded 20 per cent., while pigs reacted in different ways, mostly rejecting the oats, however, or taking them unwillingly when over 20 per cent. of infection was present. It was experimentally shown that the daily increase over a 77-day period in the weight of pigs

fed on grain with over 20 per cent. infection was only 520 gm. compared with 560 gm. for those receiving healthy grain.

Contrary to expectation, the weight of diseased oat grains was not necessarily reduced or their germinative capacity impaired.

Transverse sections through heavily infected grains revealed the presence of hyphae in most of the pericarp cells, and penetrating the testa to reach the albumin layer. In very severe cases the cells even of the embryo were found to contain hyphae.

Germination and field tests showed that infection of oat seedlings by *G. saubinetii* takes place either from the seed or through the soil. It was ascertained that infection from both these sources may be successfully combated by seed-grain treatment with various fungicides, including germisan 225, uspulun, and jyväs. Early sowing is recommended, as it has been found that high temperatures at the time of emergence favour the development of the fungus. Close, damp weather during harvesting and storage in musty boxes also promote infection. Some correlation appears to exist between the colour of the oat husks and reaction to *G. saubinetii*, the white varieties, such as Goldregen, Yellow Canada, and Siegfried being more susceptible than the black or brown ones, e.g., Glocken [Bell] and Orion II. In addition to the seed treatment the writer recommends thorough drainage and good tillage; the substitution of lime and phosphates for animal manure; and the removal after harvest of all stubble from fields to be put under grass or root crops in the following season.

[O'Brien (D. G.) & Dennis (R. W. G.).] **Helminthosporium disease of Oats.**—*West of Scotland Agric. Coll. (Dept. of Plant Husbandry) Res. Bull.* 3, 74 pp., 23 pl., 7 graphs, 1 map, 1933.

A comprehensive study has been made in south-west Scotland on the leaf stripe disease of oats caused by *Helminthosporium avenae* [*R.A.M.*, xii, p. 162], the incidence of the seedling phase of which in 225 fields in seven counties averaged 30·2 per cent. Up to the present the disease has been recorded in Europe, North America, Japan, and India. A description is given of the primary and secondary symptoms of infection, followed by a detailed account of the cultural and morphological characters of the fungus. Saltation was of frequent occurrence in the strains of *H. avenae* used in the investigations, the mutants being characterized by variations in density of growth as well as in colour. Pycnidia have not been observed in the field and developed only in one culture on maize meal agar from a secondary infection on old leaves; they extruded hyaline, circular to slightly elliptical pycnospores, 2 by 2 to 3 μ, which failed to germinate either in water or on oatmeal agar at room temperature or 25° C. The small knots of compacted cells occurring at intervals along the resting mycelium on the infected glumes and paleae may be regarded as imperfect sclerotia. True sclerotia are more abundant on diseased material, especially leaves lying in the field after harvest. These organs which, like the pycnidia, are visible to the naked eye as minute, black dots, are compact, spherical or elliptical, deeply embedded in the host tissues flanking the vascular bundles, with a dark brown, papillate outer wall enclosing a colourless, thin-walled pseudo-

parenchyma full of oil globules. They may be immature stages of the perithecial form, *Pleospora avenae* [ibid., x, p. 234]. The fungus grows well between P_H 5 and 6·75, its optimum temperature being about 20° and maximum about 30° C. Prolonged exposure to temperatures below the freezing point does not injure it. Germination seems to be impossible at a relative humidity below 96 per cent.

Prior to penetration of the leaf by *H. avenae* an appressorium is produced on the germ-tubes at random, from the lower side of which an infection hypha enters the stomatal cavity or penetrates the cuticle of an epidermal cell, across which it passes to emerge into an intercellular space. Subsequent growth is entirely intercellular [cf. next abstract]. The vital importance of a high degree of atmospheric humidity for successful infection was shown by the failure of inoculation experiments with conidial suspensions on the leaves of plants under a bell jar which became completely dry within 24 hours. Under these conditions the host is enabled to develop a protective mechanism and no lesions are formed. Only in a saturated atmosphere in closed Petri dishes were leaf spots produced in these tests, infection being most intense on the parts in contact with the glass and surrounded by a persistent film of moisture. Possibly the late appearance of secondary infection in the field may be due to the more humid conditions found in the mature crop.

Microscopically the leaf lesions show three distinct zones, of which the outermost is marked by incipient disorganization of the chloroplasts, the intermediate is the region of active parasitism, while the central area is mummified and desiccated.

Of the 14 oat varieties obtained from different sources and tested for their reaction to *H. avenae* at Kilmarnock, Ayrshire, none gave any indication of outstanding resistance. The most susceptible were Sovereign and Ascot (20 and 23 per cent. infection, respectively). Details are given of the control of the disease by seed disinfection with ceresan.

Smith (N. J. G.) & Putterill (K. M.). **A disease of Eleusine and notes on invasion of phloem by Helminthosporia.**—*S. African Journ. of Sci.*, xxx, pp. 198–205, 3 figs., 1933.

Eleusine indica, a nutritious stock grass in South Africa, is liable to infection by *Helminthosporium leucostylum* [*R.A.M.*, xi, p. 426], which causes a black-dusted withering and splitting of the leaf tips, followed by a brown spotting of the lower portions due to secondary infection by wind-blown conidia.

The morphological features of the fungus agree with Drechsler's description [ibid., iii, p. 67]. The germ-tubes sometimes enter the host through the stomata or they may penetrate the cuticle by means of a narrow peg, which swells into a vesicle with dense contents, forces the cell walls apart, and elongates into a hypha between two epidermal cells. The fungus evidently secretes a substance that acts on the middle lamellae in advance of the hyphae, which gradually force their way downwards until the bundle sheath is traversed. At this stage thick hyphae may be seen in the sieve-

tube cavities, but only when the resistance of the host is completely broken down do they enter the vessels. A similar invasion of the phloem has been observed by the senior author in barley infected by *H. gramineum* [ibid., xii, p. 162], the coleoptiles of which were most severely affected in the vascular region. These facts are considered to afford a more plausible explanation of the destructive character of barley leaf stripe than the theory of a purely intercellular life of the fungus. *H. avenae* probably invades the phloem cells of oats even more readily [see preceding abstract].

Hume (A. N.) & Franzke (C. J.). **The germination of seed Corn and its relation to the occurrence of molds during germination.**—*South Dakota Agric. Exper. Stat. Bull.* 275, 19 pp., 7 figs., 1933.

A preliminary survey of seed maize from 24 sources in five counties of eastern South Dakota showed that moulds, sometimes developing into destructive ear rots, are commonly present to the extent of 12·5 to 76·4 per cent., the organisms most frequently encountered being *Diplodia zeae*, *Fusarium* spp., *Gibberella saubinetii*, *Cephalosporium acremonium* [*R.A.M.*, x, pp. 180, 644], and *Rhizopus* spp. The results of five years' rag-doll germinator tests showed that the germination percentage of mouldy kernels was consistently lower than that of healthy ones.

Fawcett (H. S.) & Jenkins (Anna E.). **Records of Citrus canker from herbarium specimens of the genus Citrus in England and the United States.**—*Phytopath.*, xxiii, 10, pp. 820–824, 1 fig., 1933.

A tabulated account is given of the writers' examination of English and American herbarium specimens of citrus canker (*Pseudomonas citri*), from which it appears that the earliest herbarium materials of the disease are those on *Citrus medica* from north-western India (? 1827–31) and on *C. aurantifolia* from Java (1842–4).

Reydon (G. A.). **Voorloopige mededeeling over Diplodia en takkenboeboek.** [A preliminary note on *Diplodia* and branch borer.]—*De Bergcultures*, vii, 42, pp. 1172–1178, 2 figs., 1933.

A description is given of the symptoms of infection of *Hevea* rubber bud grafts and seedlings in Java by *Botryodiplodia theobromae*, and the relationship of this common trouble to sun scorch [*R.A.M.*, xi, pp. 432–433] is discussed. The same fungus was also found infecting coffee shortly after the invasion of the latter by the black branch borer (*Xyleborus morstatti*). Although the actual incidence of infection by *B. theobromae* is highest on coffee during the rainy season (correlated with favourable conditions for the ambrosia fungus supplying the borer with food) [cf. ibid., vii, p. 511], the resultant die-back of the branches is more noticeable in the succeeding dry period. At this time the oxygen requirements of the organism are more readily met by the wood tissues and the condition of the host is less vigorous. The problem of

control is briefly outlined. The paper, given at a meeting of the 'Koffie- en Rubberkring te Djember' in September, 1933, was followed by a discussion (pp. 1179–1180).

HANSFORD (C. G.), HOSKING (H. R.), STOUGHTON (R. H.), & YATES (F.). **An experiment on the incidence and spread of angular leaf-spot disease of Cotton in Uganda.**—*Ann. of Appl. Biol.*, xx, 3, pp. 404–420, 5 diags., 3 graphs, 1933.

In an experiment [a preliminary account of which has already been noticed: *R.A.M.*, xii. p. 439], conducted in 1931–2 in Uganda to investigate the incidence and spread under field conditions of angular leaf spot of cotton (*Bacterium malvacearum*), plots were sown, respectively, with untreated seed from a moderately attacked crop; with seed dusted with Dupont granosan; seed delinted for 40 mins. with concentrated sulphuric acid, washed, immersed in 1 per cent. mercuric chloride solution under a partial vacuum for 15 mins., and washed again; and seed soaked in a strong suspension of *Bact. malvacearum*.

The results [which are tabulated, plotted, and fully discussed] demonstrated that the seed treatments markedly reduced the amount of disease present. That seed dusting increases total germination was shown by the fact that the dusted seed gave more plants by the end of the season than the remainder, allowing for the plants killed by the disease. The sterilization with sulphuric acid and mercuric chloride greatly reduced the amount of infection present throughout the season. The inoculated plants had a significantly higher, and the delinted plants a significantly lower, incidence of disease than the others. Primary infection was restricted almost entirely to the inoculated seed; it appeared within a fortnight of sowing and reached its maximum about a month later. In general, there was an evident tendency for the disease to spread down the slope of the land, the main lines of surface wash after a very heavy fall of rain marking the direction in which the disease spread.

Blackarm lesions were present only on leaf-spotted plants, among which they were evenly distributed. Analysis of the stem and branch infections indicated that most of them were extensions of petiole lesions [ibid., xii, p. 422]. Petiole infections originate in the leaf, the organism passing down the cortical tissue of the leaf stalk and reaching the cortex of the stem or branch. The relatively small increase in the number of lesions on the main stems, as compared with that on the branches and short shoots arising from secondary buds, further showed that *Bact. malvacearum* can obtain a foothold only in young, immature tissues.

PETCH (T.). **Notes on entomogenous fungi.**—*Trans. Brit. Mycol. Soc.*, xviii, 1, pp. 48–75, 1933.

In continuation of his earlier papers on entomogenous fungi [*R.A.M.*, xii, p. 216] the author describes and discusses a number of species of *Cordyceps* and *Isaria*, mostly from tropical and subtropical regions, including one previously undescribed species found on Orthoptera in Ceylon and named *Isaria orthopterum* Petch n. sp., a diagnosis of which is given in English and Latin.

Castellani (A.) & Jacono (L.). **Observations on fungi isolated from cases of blastomycosis cutis and blastomycosis pulmonalia in North America and Europe. Remarks on blastomycetin.**—*Journ. Trop. Med. & Hygiene*, xxxvi, 20, pp. 297–321, 56 figs., 1 col. pl., 1933.

After some preliminary clinical observations on the cases of dermal and pulmonary blastomycosis forming the basis of the present studies, the writers give morphological and cultural particulars of the following organisms, accompanied by critical notes on their taxonomy: *Geotrichum immite* [*Coccidioides immitis*: *R.A.M.*, xiii, p. 95], *G.* (*Blastomyces*) [*Endomyces*] *dermatitidis* [loc. cit.], *G. multifermentans* Cast. 1933, *G. louisianoideum* Cast. 1933, *Monosporium tulanense* [ibid., xii, p. 171], *M. venezuelense* Cast. 1933, *Glenospora lanuginosa* [loc. cit.], *G. meteuropaea* Cast. 1933, *G. metamericana* Cast. 1933, *G. brevis* Cast. 1933, *Torulopsis hominis* Vuill. var. *honduriana* Cast. 1933 (*Cryptococcus hominis* var. *hondurianus*, *C. hondurianus*), *Candida pinoysimilis* Cast. 1933, *Torulopsis* (*Monilia* or *Cryptococcus*) [ibid., viii, p. 677 ; xii, p. 288] *castellanii*, and *T.* (*M.* or *C.*) *macroglossiae* [ibid., v, p. 98]. A number of other fungi, capable of inducing blastomycosis but not yet isolated by the writers, are briefly described.

By the method generally adopted in the preparation of the old tuberculin, monovalent and polyvalent blastomycetins were derived from culture filtrates of the principal types of fungi under investigation and used in serological and cutaneous tests. So far the results have been positive in two cases and doubtful in two, while seven healthy persons reacted negatively to the treatment.

A bibliography of 76 titles is appended.

Gillies (M.). **A case of blastomycosis.**—*Canada Med. Assoc. Journ.*, xxix, 2, pp. 183–185, 4 figs., 1933.

Clinical details are given of a case of generalized blastomycosis in a 15-year-old boy in Manitoba. The symptoms of the disease were strongly suggestive of tuberculosis, but a species of *Blastomyces* isolated from ulcers on the arm and leg is considered to have been definitely responsible for the condition, which yielded to the internal administration of potassium iodide. From a review of the recent literature on blastomycosis it is concluded that 95 per cent. of systemic infections are fatal.

Aneck-Hahn (H. G. L.). **Blastomycosis of the central nervous system.**—*South African Med. Journ.*, vii, 11, pp. 369–370, 1933.

Clinical details are given of a fatal case of blastomycosis of the central nervous system in a 35-year-old woman, from whose spinal fluid a typical sprouting blastomycete (? *Torula* or *Cryptococcus*) was isolated [cf. *R.A.M.*, xii, p. 629].

Smith (L. W.) & Sano (M. E.). **Moniliasis with meningeal involvement.**—*Journ. Infect. Dis.*, liii, 2, pp. 187–196, 2 figs., 1933.

Full clinical details are given of a fatal case of moniliasis with meningeal involvement in an under-nourished, rachitic infant of

22 months. The organism recovered from the lungs and brain appeared, notwithstanding certain minor cultural, fermentative, and serological variations, to be identical with *Monilia* [*Candida*] *albicans* [see next abstract]. The fungus proved highly pathogenic to rabbits, producing definite meningitis as well as focal lesions in the brain on intravenous inoculation.

Benham (Rhoda W.) & Hopkins (Anne McH.). **Yeastlike fungi found on the skin and in the intestines of normal subjects. A survey of one hundred persons.**—*Arch. of Dermatol.*, xxviii, 4, pp. 532–543, 7 figs., 1933.

Monilia [*Candida*] *albicans* was not recovered from the skin or nails of 100 normal young adults, in 72 per cent. of whom, however, other yeast-like organisms were detected in these sites, chiefly *Cryptococcus* and *Mycoderma* spp. Similar organisms were obtained from the tongue or faeces in 80 per cent. of the cases studied, including *C. albicans* in 18 per cent. The absence of this fungus from normal skin and nails supports previous evidence as to its pathogenic rôle in affections of these parts [cf. *R.A.M.*, x, p. 382 ; xii, p. 569, and next abstract]. In the gastro-intestinal tract, on the other hand, *C. albicans* does not necessarily produce any disturbing symptoms, though its persistent presence in the faeces of persons suffering from cutaneous moniliasis suggests that it may act as a source of skin infection.

Connor (I.). **Chronic paronychia due to Monilia.**—*Med. Journ. of Australia*, xx (II), 10, pp. 312–316, 2 figs., 1933.

Monilia [*Candida*] *albicans* was isolated from 14 cases of chronic paronychia at the Melbourne Hospital [cf. *R.A.M.*, xi, pp. 645, 714], the fungus being identified by its morphological and cultural characters and biochemical and serological reactions [details of which are given]. With one exception (a laboratory worker) all the patients were women.

Grigoraki (L.). **D'après quelles formes botaniques devons-nous classer les cultures glabres ?** [In which botanical groups should we classify the smooth cultures ?]—*Comptes rendus Soc. de Biol.*, cxiv, 30, pp. 259–262, 1933.

Discussing the classification of the dermatophytes forming smooth colonies in culture, the writer maintains that the arthrospores are the most constant reproductive organs associated with this type of growth, the aleuria being much less persistent and consequently of little diagnostic value. The genus *Arthrosporia* [*R.A.M.*, iv, p. 478] should therefore be upheld.

Grigoraki (L.). **Sur une nouvelle espèce de favus : Arthrosporia gougeroti.** [On a new species of favus : *Arthrosporia gougeroti.*]—*Comptes rendus Soc. de Biol.*, cxiv, 30, pp. 258–259, 1933.

From a generalized favus in a native soldier of Madagascar a fungus was isolated, characterized on Sabouraud's medium by

the production of large chains of plurinuclear arthrospores, 4 to 6 μ in diameter, and of oval aleuria not exceeding 3 μ in length. The macroscopic aspect of the cultures differed from that of *Arthrosporia* (*Achorion*) *schoenleini* in the white, downy surface (pleomorphism) and the fungus is accordingly named *Arthrosporia gougeroti* n. sp. [see preceding abstract].

YI (L. H.). **Die Wachstum verhindernde und abtötende Wirkung verschiedener chemischer Mittel auf Epidermophyton rubrum, Epidermophyton interdigitale und Trichophyton pedis A und B.** [The growth-inhibiting and destructive action of various chemical preparations on *Epidermophyton rubrum*, *Epidermophyton interdigitale*, and *Trichophyton pedis* A and B.]—*Dermatol. Wochenschr.*, xcvii, 43, pp. 1526–1532, 2 figs., 1933.

Thymol (1, 3, 5, or 10 per cent. in 50 per cent. alcohol), Castellani fuchsin, benzoic acid (0·5, 1, or 2 per cent. in 50 per cent. alcohol), and salicylic acid (5 and 10 per cent. in 50 per cent. alcohol) inhibited the growth of honey-agar cultures of *Epidermophyton* [*Trichophyton*] *rubrum*, *E. interdigitale*, and *T. pedis* A and B isolated from epidermophytoses of the feet in China [*R.A.M.*, xi, p. 44; xii, p. 630]. Thymol (10 per cent.) destroyed *T. pedis* B in one minute, *T. pedis* A in five minutes, and *T. rubrum* in 1½ hours, but was ineffective against *E. interdigitale* after two hours' exposure. At 0·5 per cent. benzoic acid killed all the organisms in one minute except *T. pedis* A which required five minutes' exposure. All were destroyed by salicylic acid at 5 per cent. in one minute, while fuchsin killed all in the same time except *E. interdigitale*, for which a period of five minutes was necessary. The growth of all the organisms was further inhibited by 10 per cent. resorcin and hexylresorcinol 1 in 1,000 [ibid., xii, p. 509], the latter also killing *T. pedis* A and B and *T. rubrum* in one minute, while *E. interdigitale* withstood its action for 1½ hours. Resorcin at 1 and 3 per cent. inhibited the growth of *T. pedis* A and B, and also of *T. rubrum* at 5 per cent.; at 1 per cent. it killed *E. interdigitale* in 1½ hours, while *T. rubrum* and *T. pedis* A succumbed to 3 per cent. after the same time and *T. pedis* B in two hours.

The inhibitory action of alcohol, carbolfuchsin, mercurochrome 220, sodium thiosulphate, and rivanol was negligible.

MUENDE (I.). **Allergic skin affections related to fungus infection.** —*Post-Grad. Med. Journ.*, N.S., ix, 92, pp. 197–205, 1933.

A review is given of the allergic manifestations [*R.A.M.*, viii, p. 310; x, p. 313] associated with infection by *Trichophyton gypseum*, *Microsporon audouini*, *Epidermophyton* Kaufmann-Wolf, and *Achorion quinckeanum*, for which the terms 'trichophytid', 'microsporid', 'epidermophytid', and 'favid', respectively, are suggested, while 'mycids' (Bloch's term) should be used to cover the whole group. Jadassohn's 'trichophytid' should not, as at present, be applied to the allergic skin affections associated with the other fungi referred to above.

AGOSTINI (A[NGELA]) & FERRARI (A[NGELA]). **Varietà di Sarcopodium fuscum parassita dell'Uomo.** [A variety of *Sarcopodium fuscum* parasitic on man.]—*Boll. Soc. Ital. di Biol. Speriment.*, viii, 5, pp. 1–2, 1933.

From an abscess in the leg of a male patient a fungus was isolated which in culture developed erect, tortuous, simple or (very occasionally) bifurcated, septate, yellowish-brown, sterile hyphae measuring 51·20 to 56·32 by 5·12 to 7·68 μ, short, continuous, hyaline, filiform conidiophores, and elongated, subfusiform, slightly arcuate, hyaline conidia measuring 16·38 to 25·74 by 2·34 to 4·68 μ. The fungus is identified as a species of *Sarcopodium*, differing from *S. fuscum* Corda in the dimensions of the sterile hyphae and conidia (which, in Corda's fungus are, respectively, 300 by 4 μ and 5·6 by 1 μ), and in the nature of its host; it is named *S. fuscum* Corda var. *hominis* Agostini and Ferrari.

COTTON (A. D.). **The detection and control of Lily diseases.**—*ex* Lily Year Book 1933, London, Royal Hortic. Soc., pp. 194–210, 3 figs., 1933.

A semi-popular account is given of three important diseases affecting lilies in the British Isles, namely, leaf spot (*Botrytis elliptica*) [*R.A.M.*, xi, p. 249], mosaic [ibid., xi, pp. 244, 797; xii, p. 292], and yellow flat or rosette (the latter name preferred by the British Mycological Society) [ibid., xi, pp. 97, 244].

In connexion with leaf spot, mention is made of Miss M. R. F. Taylor's recent experiments at Kew, which showed that the mycelium of *B. elliptica* persists throughout the winter in the lesions formed in late summer and autumn on the basal leaf rosette of *Lilium candidum* and renews the production of spores in the spring. Spores are also produced by the sclerotia at any time between March and July. During a spell of hot weather at Kew in July, 1932, the mycelium was destroyed by the sunlight and further sporulation effectually prevented. Close, damp conditions, with frequent showers, are probably the most favourable for severe attacks of the disease. In addition to *L. candidum*, the following species are susceptible to infection by *B. elliptica*: *L. auratum*, *L. croceum*, *L. dauricum*, *L. hansonii*, *L. humboldtii*, *L. martagon*, *L. pardalinum*, *L. speciosum*, *L. testaceum*, and *L. henryi*; while *L. pyrenaicum*, *L. regale*, and *L. willmottiae* are comparatively resistant. Indications are given for the control of leaf spot by cultural measures and the application to the soil and plant bases of calcium bisulphite (4 oz. per gall.) or treatment with a standard fungicide such as Bordeaux mixture or copper-lime dust.

The characteristic symptoms of mosaic [which are described] are commonly observed in a mild form in *L. longiflorum*, *L. tigrinum*, *L. humboldtii*, and *L. croceum*, whereas in *L. auratum* and *L. speciosum* the mottling is much coarser and more conspicuous. The wholesale deterioration of *L. candidum* may be largely attributed, in the author's opinion, to mosaic infection, the symptoms of which, however, are usually masked in the summer. *Aphis gossypii*, the vector of the lily mosaic virus, is abundant on lilies in the greenhouses at Kew and has been found in the open from April

onwards. Control measures, based on the prevention of spread by aphids and the raising of clean stocks, are indicated.

Even mild attacks of rosette preclude the formation of normal flowers. The three most prominent symptoms are marked dwarfing due to shortened internodes; pale colour of the foliage unaccompanied by mottling; and downward curling or twisting of the leaves. Like mosaic, rosette is conveyed from diseased to healthy plants by *A. gossypii*.

This paper (read on 13th July, 1933, at the Lily Conference held by the Royal Horticultural Society) was followed by a discussion (pp. 210–214).

MATHUR (R. N.). **Leaf-curl in Zinnia elegans at Dehra Dun.**—*Indian Journ. Agric. Sci.*, iii, 1, pp. 89–96, 2 pl., 1933.

An acropetal necrosis [*R.A.M.*, xi, p. 740] or leaf curl of *Zinnia elegans*, apparently identical with that of cotton in the Sudan and found to be transmitted by the same vector, *Bemisia gossypiperda*, is stated to be very prevalent at Dehra Dun, India [ibid., xi, p. 573]. A characteristic effect of the disease is the thickening of the lower surface of the veinlets, preceded by curling of the leaf blades. Infection begins at the growing points of the younger leaves and disturbs the normal course of development, so that the diseased plants often fail to attain a height of more than 1 ft. and the flowers are dwarfed, of a poor colour, and partially sterile. During the warm, damp season the axillary buds are forced into growth and form stunted shoots with small, crinkled leaves often massed together in a rosette or bunchy form. Leaf curl is most prominent during the period from July to September, when *B. gossypiperda* is most abundant. A fully detailed and tabulated account is given of the transmission experiments, the results of which left no doubt as to the part played by these insects in the conveyance of infection from diseased to healthy plants. It was found, however, in opposition to Kirkpatrick's observations in the Sudan [ibid., xi, p. 238], that actual feeding on a diseased plant by the adults is a necessary preliminary to transmission of the virus, which was not conveyed by freshly emerged insects reared from nymphs fed on viruliferous material.

GREEN (D. E.). **A Lupin disease due to Ceratophorum setosum (Kirchner), a fungus new to Great Britain.**—*Journ. Roy. Hort. Soc.*, lviii, 1, pp. 144–145, 2 pl., 1933.

Ceratophorum setosum was found in the summer of 1932 infecting a large number of lupin (*Lupinus cytisoides*) seedlings at Wisley, Surrey, this being the first record of the fungus in England, though it has been reported on *Cytisus capitatus* and *C. laburnum* from Germany [also on lupins], Denmark, Switzerland, [and on lupins from Holland, Italy, and Poland: *R.A.M.*, v, p. 672; viii, p. 630, *et passim*]. The foliage showed an extensive greyish-brown spotting, the centre of each circular lesion being very dark brown and the outer portion formed by alternating pale and dark zones, merging into light yellowish-green. Diseased leaves were rapidly killed from the base of the stem upwards. Inoculation experiments

on *C. capitatus* and *C. laburnum* gave positive results. In 1933 *L. cytisoides* was again severely attacked and *L. polyphyllus* in adjacent plots also contracted the infection, but in a milder form. The fusiform, dark brown, 2- to 7- (mostly 5-) septate spores of the fungus measure 62 by 17 μ, and are provided with four or more tapering, hyaline setae, attached to the apical cell and about equal in length to the spores.

MEHLISCH. **Wurzelkropf an Dahlien.** [Crown gall of Dahlias.]—*Ratschläge für Haus, Garten, Feld*, viii, 10, p. 168, 1 fig., 1933.

Crown gall (*Pseudomonas* [*Bacterium*] *tumefaciens*) is stated to have recently been observed in dahlias [*R.A.M.*, x, p. 79] in Germany, appearing, when the roots are lifted for overwintering, as shapeless, rather hard masses which may reach a considerable size. A second form, consisting of many shoots arising from a cauliflower-like base, may appear in the spring. Control measures should include the eradication and burning of diseased material, dipping the roots before planting in an emulsion of uspulun and loam, soil disinfection with uspulun, and the application of a lime fertilizer.

CREAGER (D. B.). **Leaf scorch of Narcissus.**—*Phytopath.*, xxiii, 10, pp. 770–786, 8 figs., 1933.

Narcissus [*Narcissus* spp.] and amaryllis (hybrids of *Hippeastrum vittatum*) in the eastern United States and elsewhere have been found to suffer considerable damage from leaf scorch (*Stagonospora curtisii*) [*R.A.M.*, xii, p. 79], chiefly affecting the *Leedsii* and *Polyanthus* types of narcissus and occurring on a number of commercial varieties, such as Sir Watkin, King Alfred, White Lady, Queen of the North, Laurens Koster, Orange Cup, Early Perfection, and Victoria. The initial symptoms of the disease consist in yellowish, reddish, or brown lesions, rapidly developing into necrotic areas at the leaf tips; later in the season numerous secondary lesions (the principal source of injury) appear as reddish-brown spots near the primary ones. On susceptible varieties the foliage is partially or wholly destroyed from four to eight weeks before the normal time of death.

Greenhouse and field inoculation experiments with the mycelium and spores of *S. curtisii* gave positive results on Sir Watkin and on a variety of *N. poeticus*. Observations and experimental data indicate, but have not yet definitely proved, that the fungus overwinters in or on the bulbs, which would thus constitute the main source of inoculum for the primary infection. Numerous pycnidia are produced in the necrotic areas. As already noticed by C. O. Smith [ibid., ix, p. 318], the spores of *S. curtisii* are extremely variable in size and septation, the minute, unicellular type predominating under artificial culture conditions, while on the host the majority are quadricellular. Rain water is the chief agent of spore dissemination in the field. The fungus enters the host directly through the cuticle by means of an infection hypha from an appressorium at the tip of the germ-tube and proceeds to form an intercellular mycelium.

MILES (L. E.). **Control of Gladiolus scab.**—*Phytopath.*, xxiii, 10, pp. 802–803, 2 figs., 1933.

Continuing and extending the experiments initiated by H. H. Wedgworth on the control of gladiolus scab (*Bacterium marginatum*) in Mississippi [*R.A.M.*, vii, p. 242], the writer discusses and tabulates the data from four years' work with a number of disinfectants on some named varieties. The best results were obtained by five minutes' immersion in calogreen [ibid., xii, p. 356], used at the rate of 1 lb. in 10 l. water. Next in efficacy came a 1 in 1,000 concentration of mercuric chloride, 8 to 12 hours' immersion, while five minutes in semesan (1 oz. in 12 l.) also gave fairly good control. Calogreen was further effective against soil infestation by *Bact. marginatum* when applied at the rate of 6 oz. per 1,000 ft. Much better control of foliage infection on Pink Beauty was given by six applications of Bordeaux mixture 4–6–50 than by copper-lime dust (20–80).

GANTE (T.). **Der Erikenrost.** [The Erica rust.]—*Blumen- und Pflanzenbau*, xlviii, 9, p. 137, 1933.

During 1933 the rust of *Erica gracilis* and *E. hiemalis* caused by *Uredo ericae* is stated to have been unusually prevalent in Germany. A brief account is given of the symptoms and mode of infection of the rust, with directions for control by spraying with Burgundy mixture or Wacker's copper-lime (A. Wacker, G.m.b.H., Prinzregentenstr. 20, Munich) [*R.A.M.*, xii, p. 74].

WEST (E.). **Powdery mildew of Crape Myrtle caused by Erysiphe lagerstroemiae, n.sp.**—*Phytopath.*, xxiii, 10, pp. 814–819, 2 figs., 1933.

Crape myrtle (*Lagerstroemia indica*) in Florida is liable to infection by a new species of *Erysiphe*, *E. lagerstroemiae* [an English diagnosis of which is given]. Although the perfect stage has been found only in Florida, the same fungus is believed to be responsible for the powdery mildew of this host in other southern States. *E. lagerstroemiae* can survive the winter in the leaf buds, a single application to which of lime-sulphur 1 in 80 at the time of emergence was found to prevent the spread of infection.

PIETERS (A. J.) & HOLLOWELL (E. A.). **Red-Clover failure in relation to anthracnose in the southern part of the Clover belt.**—*U.S. Dept. of Agric. Leaflet* 98, 5 pp., 4 figs., 1933.

This is a popular account (superseding *Farmers' Bull.* 1510) of the symptoms, etiology, and control of red clover [*Trifolium pratense*] anthracnose [*Colletotrichum trifolii*: *R.A.M.*, vii, p. 448; xi, p. 461] in the area south of Pennsylvania and the Ohio River, where it constitutes an important cause of crop failure. Observations and experiments have shown that the one reliable means of combating the disease is the use of resistant seed, which may now be obtained in limited quantities from Tennessee, and is also being grown in parts of Oregon and Idaho.

SAMPSON (KATHLEEN). **The systemic infection of Grasses by Epichloe typhina (Pers.) Tul.**—*Trans. Brit. Mycol. Soc.*, xviii, 1, pp. 30–47, 3 pl., 1933.

Further studies at Aberystwyth of the infection of several species of grasses by *Epichloe typhina* [*R.A.M.*, vii, p. 327; viii, p. 314] showed that for most of the year the fungus develops as an intercellular parasite, penetrating the vegetative organs and overwintering in the perennial parts. The development of the conidial stromata coincides with the flowering period and is closely associated with host fertility. Latent infection may persist for several seasons, the infected plant sometimes remaining barren, sometimes producing some healthy panicles, and sometimes producing panicles containing the fungus but with no visible signs of infection. Mycelium was found in infected plants at all times of the year, and during flowering in the pith of fertile tillers, but it could not be traced in the roots beyond the base covered by the cortical tissues of the stem.

Two contrasted forms of the disease were observed, one on *Dactylis glomerata* and the other on *Festuca rubra*; in the former ascospore formation is abundant and seed transmission absent or rare, in the latter the reverse obtains and the seed transmits the disease.

From the pith of the axis of the inflorescence of *F. rubra* the mycelium passes into all parts of the flower, penetrating the rachilla, glumes, and pales, the filaments and anthers of the stamens, and the tissues of the ovary, extending into the branches of the style. Stamens may be so heavily infected that pollen grains do not form, or the fungus may be found only in the anther walls, and pollen production may be normal. Even in anthers containing mycelium in the pollen sacs some pollen mother-cells divide and produce apparently healthy pollen grains. A similar range of destruction was observed in the ovary. In a very young ovary the mycelium passes between the cells in the integument and nucellus. As the embryo-sac encroaches on the tissues of the nucellus mycelial strands are found within the former. In half-developed ovaries and mature grains the mycelium forms a loose, irregular network outside the aleurone layer round the embryo, and may penetrate the endosperm tissue. Embryo infections were much less frequent than seedling or plant infections, and it is considered that infection of the plumule can take place during germination from intraseminal mycelium near the embryo.

The incidence of the disease in the progeny of various families of open- and self-pollinated plants confirmed the view that the fungus is systemic in *F. rubra* and distributed by infected seed.

It was ascertained that plants of *F. rubra* may be completely invaded by the fungus without having any external signs of infection or any obvious loss in vitality or productivity, thus showing an extreme type of latent infection, comparable to that of the endophyte of *Lolium* [ibid., xii, p. 778].

ATANASOFF (D.). **Bitter pit of Apples: a virus disease?**—*Yearbook Univ. of Sofia, Fac. of Agric.*, xii, pp. 31–67, 25 figs., 1933.

The writer summarizes and discusses the available information

concerning bitter pit of apples [*R.A.M.*, xii, p. 573], an important disease in Bulgaria as elsewhere, and considers the various theories of its etiology that have been proposed. Under the term 'bitter pit' as used by the writer are comprised the conditions variously known as 'blister', 'drouth spot', 'cork' and 'blotchy cork', and 'orchard and storage pit', to each of which certain varieties are particularly inclined in a similar environment. These various injuries [brief descriptions of which are given] tend to appear more or less in the order given above, and several observers have mentioned that they merge into one another. In the writer's opinion the different types seen in the orchard do not deserve to be regarded as distinct diseases, and the storage pit is even more closely related to the orchard type of pitting. It is pointed out that other workers have considered none of the etiological hypotheses of bitter pit [which are briefly summarized] convincing, a fact that encourages the present writer to set forth his theory of a virus origin. An early observation by McAlpine ('Bitter pit investigations. First progress report', 1911–12) to the effect that the disease is most severe in trees grafted on Northern Spy already points in this direction, and may indicate the widespread infection of this commonly used stock, especially as it has been reported both in Australia and South Africa that seedlings may remain free from bitter pit for many years. Mix's experimental data, reported in *New York (Geneva) Agric. Exper. Stat. Bull.* 426, 1916, also lend support to the virus theory. In agreement with Mix and Cunningham, the writer found at the Philippopolis State Nursery that on one tree (White Astrachan) only certain branches were affected while other trees showed a complete gradual decline. A description is given of various symptoms of a number of virus diseases of other plants which the writer considers to show close analogies to bitter pit of apple. These include plum pox [*R.A.M.*, xii, p. 229], potato streak and net necrosis, tomato streak, 'buck-skin' of cherry [ibid., x, p. 528], 'black measles' of the vine (with which are synonymous the California vine disease, little leaf, roncet, court noué, arricciamento [ibid., xii, p. 419], mal nero, mosaic, &c.), ring spot [ibid , xii, p. 455] of apples, and infectious variegation [ibid., xii, p. 632]. In fact, just as the term 'curl' formerly covered all virus diseases of the potato, so is 'bitter pit' now used to designate a whole group of allied conditions which can only be separated on the basis of careful study.

Ballou (F. H.) & Lewis (I. P.). **Dusting versus spraying Apple orchards in Ohio.**—*Ohio Agric. Exper. Stat. Bull.* 527, 17 pp., 5 figs., 1933.

A fully tabulated account is given of seven years' experiments, from 1926 to 1932, on the comparative merits of dusting and spraying for the control of fungous diseases and insect pests of apples in Ohio [cf. *R.A.M.*, vii, p. 451]. Of the 171 test plots under observation, 97 were dusted and 74 sprayed, all the dusts being compared with the modified dry lime-sulphur-hydrated lime spray which has effectively prevented scab (*Venturia inaequalis*) during the last ten years.

The combination of 15 per cent. refined dry lime-sulphur with pure superfine dusting sulphur proved beneficial for the pre-bloom and petal-fall applications, but for the later ones in warmer weather 10 or 5 per cent. suffices, and in midsummer the lime-sulphur may be omitted as the sulphur is potent enough alone. Copper-lime dust (20–80) gave good control both of scab and Brooks's spot (*Phoma* [*Mycosphaerella*] *pomi*), but was found liable to cause russeting on certain varieties such as Jonathan, for which reason the equally efficacious 10–90 combination is preferable. The Rome variety showed a high degree of susceptibility to scab in these trials, while Jonathan was very resistant, whereas *M. pomi* occurred in a destructive form on Jonathans and caused a fair amount of damage on Rome which responded more favourably, however, to protective treatment, especially with the harmless and inexpensive dilute copper-lime sprays ($1\frac{1}{2}$–$4\frac{1}{2}$–100 or 2–10–100). On scab-resistant varieties or in seasons adverse to the development of *V. inaequalis* sulphur-lime dusts (50–50) plus lead arsenate at appropriate intervals gave excellent results in the summer applications, following the use of higher concentrations of sulphur at pre-bloom and petal-fall. When dusting and spraying were carried out with equal thoroughness, about the same degree of tree coverage was given by 100 lb. of dust as by 650 to 700 galls. of spray. The average cost of the two treatments is approximately equal, the somewhat higher cost of the dusting materials being offset by the shorter period required for their application. Excellent results were obtained in an orchard on a steep hill slope with a stationary spraying plant [ibid., xii, p. 642], with 1,000 gall. tank capacity and pressure adjustable from 300 to 500 lb.

Suter (P.). **Erfolge systematischer Baumbespritzung.** [Results of systematic tree-spraying.]—*Schweiz. Landw. Monatshefte, 1933*, 10, pp. 269–277, 13 figs., 1933.

A final inspection at the end of October, 1932, of sprayed and unsprayed apple trees in an orchard near the Lake of Zürich showed almost complete absence of scab [*Venturia inaequalis*] from the fruits of Kassel Pippins of the former group, compared with 100 per cent. infection in the latter. The maximum incidence of leaf scab in the sprayed trees of this variety was 3 per cent. on those treated with 0·15 to 0·3 per cent. cupro-maag [*R.A.M.*, xiii, p. 11] and 18 per cent. on those receiving 2 per cent. lime-sulphur with the addition of 0·1 per cent. copper sulphate at the second pre- and third post-blossom spray and of 1 per cent. lead arsenate at the first post-blossom, the corresponding figure for the controls being 72 per cent. The trees were given seven treatments altogether, beginning with a dormant application of 8 per cent. carbolineum; 0·5 per cent. lead arsenate was added to the first post-blossom spray of 0·2 per cent. cupro-maag. Moderately good control was also obtained on the yellow Bellefleur, Baumann's Pippin, Boskoop, and a few other varieties, but the treatment of Gravenstein and Landsberg Pippin was less successful, partly owing to their exceptionally luxuriant foliage and constant new growth.

Dey (P. K.) & Nigam (B. S.). **A soft rot of Apple.**—*Indian Journ. Agric. Sci.*, iii, 4, pp. 663–672, 3 figs., 1933.

Aspergillus niger was isolated from market apples affected by soft rot in the United Provinces, India [*R.A.M.*, x, p. 392], sour varieties being particularly susceptible owing to the preference of the fungus for an acid medium (optimum for growth between P_H 3·4 and 3·8). Inoculation experiments on the Amhri variety from Kashmir gave positive results, *A. niger* being reisolated from the characteristic rotted areas. Wounding was found to be a necessary condition of infection. An enzyme secreted by the hyphae was shown to be responsible for the softening of the flesh, and this was destroyed by heating to 70° C.

Oserkowsky (J.) & Thomas (H. E.). **Exanthema in Pears and its relation to copper deficiency.**—*Science*, N.S., lxxviii, 2023, pp. 315–316, 1933.

A marked improvement in the condition of Bartlett pear trees affected by exanthema in California was obtained by spraying with Bordeaux mixture, as well as by the introduction of soluble copper salts into the trunks [*R.A.M.*, vii, p. 643]. Leaf and twig analyses showed the copper content of diseased leaves (3·1 to 5·1 parts per million) to be lower than that of normal leaves from a part of the orchard free from the disease (5·6 to 7·6 p.p.m.) and considerably below that of healthy foliage from localities in which exanthema is absent (11 to 20 p.p.m.). The copper content of healthy-looking leaves from diseased trees was only 3·5 to 4·9 p.p.m. It is considered to be apparent from these data that copper deficiency is directly or indirectly responsible for exanthema in pears.

Thornberry (H. H.) & Anderson (H. W.). **Overwintering of Phytomonas pruni on Peach.**—*Phytopath.*, xxiii, 10, pp. 787–801, 6 figs., 1933.

In 1930 a new type of twig canker due to *Phytomonas* [*Bacterium*] *pruni* [*R.A.M.*, xii, p. 268] was observed on peach trees in Illinois. These lesions, which have been termed 'spring cankers', developed on young, succulent twigs of the past season's growth in the form of water-soaked, rather dark, raised blisters, about the time of leaf emergence. The cankers are 1 to 10 cm. in length and usually extend half-way round the twig which may, however, be entirely girdled near the terminal bud so that a kind of die-back results. The bacteria are restricted to the cortical tissue; later in the spring the epidermis over the lesions is ruptured and the organisms are then liable to be disseminated to adjacent leaves by rain or dew. The ruptured, infected tissue darkens and dries out during the summer, and forms deep cankers persisting through the following winter. Natural primary foliage infections were observed to be correlated with the spring cankers during three successive years. Trees of the Brackett variety, pruned of their one- and two-year-old twigs to eliminate the spring cankers, did not contract bacterial leaf spot until infection became general in the orchard. *Bact. pruni* was repeatedly isolated from young spring cankers, whereas only 1 in 370 attempted isolations from

over-wintering cankers yielded the pathogen. Cultures of the organism on dextrose-beef extract agar survived the winter of 1930–1 at Urbana and withstood refrigerator temperatures of −2° to 2° C. for five months. Its minimum, optimum, and maximum temperatures for growth are 7°, 25°, and 38°, respectively. In artificial twig inoculations *Bact. pruni* survived the winter of 1931–2 at Yonkers, New York, and produced typical cankers in the following spring.

BERKELEY (G. H.). **Strawberry root rot in England.**—*Nature*, cxxxii, 3336, p. 571, 1933.

The general features of the strawberry root rot in Kent and Sussex plantations are stated to resemble the disease as it occurs in Canada and the United States [*R.A.M.*, xi, p. 251], a conspicuous character being the black lesions on the larger roots and the scarcity of laterals. Of the many fungi isolated from diseased roots at the East Malling Research Station, a species of *Coniothyrium* [ibid., xi, p. 252] has proved consistently pathogenic in inoculation tests, both with an infusion of macerated roots and with pure cultures.

BRAUN (K.). **Der gegenwärtige Stand unserer Kenntnisse vom Stachelbeer- und Johannisbeerrost. (Puccinia ribis D.C. und P. pringsheimiana Kleb.).** [The present status of our knowledge concerning Gooseberry and Currant rust. (*Puccinia ribis* DC. and *P. pringsheimiana* Kleb.).]—*Die Kranke Pflanze*, x, 10–11, pp. 139–143, 1 col. pl., 1933.

From a study of the works of Eriksson, Frank, Gäumann, Klebahn, Laubert, Rabenhorst, Sorauer, Tubeuf, and other authorities on currant rust (*Puccinia ribis*) [*R.A.M.*, x, p. 260] and gooseberry rust caused by *P. pringsheimiana* (*P.* [*ribesii*]-*curicis*) [ibid., xii, p. 381], the writer has compiled a concise, semi-popular account of the symptoms and life-histories of these organisms, preceded by a brief historical sketch and followed by directions for the control of the more important gooseberry rust.

ESMARCH (F.). **Blattfallkrankheit und Säulenrost der Johannisbeere.** [Leaf fall disease and pillar rust of the Currant.]—*Die Kranke Pflanze*, x, 10–11, pp. 137–139, 1 col. pl., 1933.

Notes are given in semi-popular terms on the symptoms, etiology, and control of leaf fall (*Pseudopeziza ribis*) [*R.A.M.*, xii, p. 773] and pillar rust (*Cronartium ribicola*) of currants in Germany.

LÖHNIS (MARIE P.). **Randjesziekte bij Aalbessen.** [Leaf scorch of Red Currants.]—*Tijdschr. over Plantenziekten*, xxxix, 10, pp. 268–275, 2 pl., 1933. [English summary.]

The writer's experiments [details of which are given] on the control of leaf scorch in red currants (Hoorn Yellow Stem) grown in nutrient solutions in culture jars at Wageningen, Holland, by the application of potassium in various forms were completely successful, the condition being prevented equally well by Van der Crone's potassium nitrate solution, potassium sulphate, or potassium chloride [*R.A.M.*, xii, pp. 302, 773].

WILLIAMS (C. F.) & POOLE (R. F.). **The relation of types of pruning to the control of Coniothyrium cane blight.**—*North Carolina Agric. Exper. Stat. Bull.* 291, 14 pp., 7 figs., 1933.

Lucretia dewberries [*Rubus flagellaris*] in the Sandhills section of North Carolina are stated to suffer considerable damage from cane blight (*Leptosphaeria coniothyrium*) [*R.A.M.*, x, p. 506], sometimes in association with *Collybia dryophila*, *Plectodiscella veneta*, and *Mycosphaerella rubi*. The first-named organism enters the plants through newly cut or pruned parts and works downwards below the parts from which fresh shoots arise, thereby severing contact between the tops and the active root portions. Control may be effected by cutting the canes at or immediately below soil level, care being taken not to break the roots or damage the crown.

CHONA (B. L.). **Preliminary investigations on the diseases of Bananas occurring in the Punjab and their method of control.**—*Indian Journ. Agric. Sci.*, iii, 4, pp. 673–687, 3 pl., 3 graphs, 1933.

Notes are given on some diseases affecting bananas in 1932 in an experimental plot at Lyallpur, in the markets of Lyallpur, Lahore, and Jhelum, and in the plantations at Lahore and Amritsar, all in the Punjab. The following were differentiated: main stalk rot, black or finger tip, pseudostem rot, leaf spot, and curvature of the midrib and leaf crumpling. *Gloeosporium* [*musarum*] and *Botryodiplodia* [*theobromae*] [*R.A.M.*, xii, pp. 105, 773] were found to be responsible for the first and the latter for the second, while both fungi were isolated from rotted pseudostems. Leaf spot is characterized by dry, brown areas with a bright yellow margin near the edge of only one-half of the lamina. This disorder being confined to the Cavendish and other varieties ill adapted to local conditions, no attempt at a detailed study has been made. The same is true of the curvature of the midrib and distortion of the leaf blade.

Storage diseases include 'green ripeness', in which the fruit remains green or dull yellow and ripens without developing a palatable flavour, presumably a form of physiological breakdown due to high temperatures; stem-end rot (*G. musarum* and *B. theobromae* [cf. ibid., ix, p. 729], successful inoculation tests with which were conducted), and finger stalk rot (*G. musarum*). Control measures are briefly discussed.

WAGER (V. A.). **A spraying experiment for the control of bacterial black spot in Mangoes.**—*S. African Journ. of Sci.*, xxx, pp. 250–254, 1933.

Satisfactory control of black spot of mango (*Bacillus mangiferae*) [*R.A.M.*, xi, p. 793] in the susceptible small yellow or Kidney variety was obtained in 1932 at Nelspruit by five applications of 4–4–50 Bordeaux mixture (11th August, 4th October, 15th and 29th November, and 21st December) or three of bouisol [ibid., xiii, p. 121] on the three later dates, using 7½ galls. of spray per tree, delivered by an ox-drawn, petrol-driven pump at 300 lb. pressure. The spraying of 20 trees, using two nozzles, occupied about an hour, and the cost per tree of the five applications of

Bordeaux mixture (commercial) is estimated at 3*s.*, a sum that could be halved by using the home-made preparation. The average increase over the controls of 40 per cent. of healthy fruit (80 per cent. when a few large, uniform trees each yielding some 1,500 fruits were compared), resulting from both the treatments proved economically profitable under the conditions of the tests.

Bongini (Virginia). **Della Phoma eriobotryae.** [On *Phoma eriobotryae.*]—*La Difesa delle Piante,* x, 4, pp. 64–70, 2 figs., 1933.

Continuing her observations and investigations of the disease of loquats (*Eriobotrya japonica*) associated with the previously undescribed *Phoma eriobotryae* [*R.A.M.*, xii, p. 641] the author states that, in culture, pycnospore germination and mycelial development took place at temperatures between 22° and 28° C., the optimum being about 25°. Forty-eight hours after sowing, numerous ochraceous-brown spots or spheroidal hyphenchymatous tufts appeared and two days later these developed into pycnidia containing immature stylospores. On the fifth day from sowing the mature pycnidia emitted characteristic conidial cirrhi. The hyaline, rod-shaped, non-guttulate spores measured 2·5 to 3 by 1·5 μ, being slightly broader in culture than on the host.

Four- to six-year-old loquat trees grown in the open in pots were inoculated with water suspensions of the pycnospores from these cultures (1) by means of cotton steeped in a spore suspension applied to the healthy, uninjured periderm and kept moist, (2) by similar inoculations on healthy branches in which superficial scratches had been made, and (3) by means of a lancet, the spores being introduced directly into the cortical parenchyma and the part kept moist with blotting paper.

A branch of the current year inoculated by the first method showed after ten days a small, sunken, definitely cankered area which gradually enlarged and split; this lesion resembled those from which the fungus had been isolated on the green branches of affected trees. After a fortnight the dead tissue at the raised edges of the canker showed the beginning of pycnidial fructification. The inoculations by the other two methods gave less conclusive results, for though lesions formed they were without the characteristic cell proliferation from below, and no pycnidia formed.

It is concluded that *P. eriobotryae* is able to parasitize the green branches of loquats, on which it produces small cankers limited to the cortical parenchyma and phloem, while on branches of more than a year old its parasitism is uncertain.

In the extended Latin diagnosis which is appended, the pycnidial diameter is given as 80 to 100 μ, in culture up to 190 μ.

Jaczewsky (A. A.). Основы Микологии. [Elements of Mycology.]—(posthumous: edited by N. A. Naoumoff)—1035 pp., 251 figs., State Publishing Office of Agric. & Collective Farming Co-operative Literature, Leningrad, 1933.

In a brief foreword by Naoumoff, it is claimed that this volume represents by far the most complete text-book now existing for the student of pure mycology, as distinct from phytopathology and

systematics, which are not touched upon by the author. The subject matter, which is treated in very considerable detail, is divided into twelve chapters, the first two of which give an account of the origin and development of the science of mycology abroad and in Russia. The remaining chapters deal with the morphology of the vegetative organs of fungi; the structure and contents of the fungal cell; the chemistry of the fungi; the enzymes produced by them; edible and poisonous fungi; the ecology and physiology of the organisms; their natural and artificial substrata (including instructions for growing them in pure culture); reproductive organs and life cycles of the fungi; their geographical distribution and their relations to other plants (including symbiosis); and finally, the teratology of the fungi. The book terminates with a bibliographical index covering nearly 170 pages, an index of the illustrations, an index of the Latin names of the fungi and their hosts cited in the text, and a general subject index in Russian.

Plagas del campo. Memoria del Servicio Fitopatologico Agricola. Año 1932. [Field pests. Memoir of the Agricultural Phytopathological Service. Year 1932.]—*Min. de Agric., Direcc. Gen. de Agric., Secc.* 3ª, 250 pp., 65 figs., 1 map, 1933.

This valuable compilation—the first of a series to be published annually—contains much useful information regarding the investigational, experimental, and supervisory activities of the Spanish agricultural phytopathological stations during 1932. It is preceded by a short account of phytopathological legislation in Spain and of the organization of the Agricultural Phytopathological Service of the country.

Stevens (N. E.). **Plant pathology and the consumer.**—*Scient. Monthly, 1933*, 10, pp. 325–329, 2 graphs, 1933.

A discussion, supplemented by statistical data from the Bureau of Agricultural Economics, the American Railway Association, and the American Wood Preservers' Association, is given of the problems of decay of fruit and vegetables in transit and of structural timbers in the open. Special reference is made to the losses caused by *Rhizopus* [*nigricans*] in tomatoes and strawberries [*R.A.M.*, xi, p. 585; xii, p. 121] and to those due to apple scald [ibid., xii, p. 703].

Smith (K. M.). **Some virus diseases of the Potato and other farm crops.**—*Scottish Journ. of Agric.*, xvi, 4, pp. 446–456, 3 pl., 2 figs., 1933.

After defining a virus and briefly touching on some common virus diseases of animals, the writer gives a general survey of present knowledge on the virus diseases of potatoes and other crops and their transmission by means of insects [*R.A.M.*, xii, p. 776].

Quanjer (H. M.). **Onderzoek naar de vatbaarheid voor plantenziekten.** [The investigation of susceptibility to plant diseases.] —*Tijdschr. over Plantenziekten*, xxxix, 10, pp. 263–267, 1933.

A brief discussion is given on the possibilities offered by the

investigation of varietal susceptibility in the control of plant diseases, with special reference to those of potatoes and wheat in Holland. Among the diseases that may eventually be controlled by selection are potato wart [*Synchytrium endobioticum*] and virus disorders, and wheat rusts [*Puccinia* spp.]. In other cases, e.g., that of potato blight (*Phytophthora*) [*infestans*], selection is considered to be of secondary importance compared with direct treatment by applications of Bordeaux mixture, while as regards *Septoria nodorum* on wheat [*R.A.M.*, xiii, p. 10], the first step is to determine the source of infection and see if it can be eliminated.

SCHMIDT (M.). **Über die inneren Ursachen der Widerstandsfähigkeit von Pflanzen gegen parasitische Pilze. (Sammelreferat).** [On the internal causes of the resistance of plants to parasitic fungi. (General survey).]—*Der Züchter*, v, 6, pp. 132–141, 7 figs., 1933.

The writer summarizes and discusses some important contributions [the more recent of which have been noticed in this *Review*] to the study of the factors governing the resistance of plants to parasitic fungi.

WILHELM (A. F.). **Beiträge zur Frage der Antikörperbildung im pflanzlichen Organismus I.** [Contributions to the question of antibody formation in the plant organism I.]—*Zentralbl. für Bakt.*, Ab. 2, lxxxix, 5–7, pp. 107–143, 1 graph, 1933.

In connexion with a critical survey of the problem of antibody formation in the plant organism, the writer repeated Kostoff's experiments on acquired immunity in the Solanaceae [*R.A.M.*, viii, p. 327]. As far as the precipitation capacity of the resultant extracts is concerned, Kostoff's data were confirmed in a general way, but his statements regarding the enhanced precipitation of grafted shoots (involving a mutual induction of antibodies in scion and stock) were found to be erroneous, probably on account of a defective technique and an inadequate number of controls. In agreement with Silberschmidt [ibid., xii, p. 314] the writer failed to detect any difference resulting from the use of extracts of the plant juices in the various Solanaceous grafts tried. In another series of tests pure extracts were used as normal or immune serum, while the antigen solutions were prepared by various methods. The combination of the different extracts or juices by Uhlenhut's technique (*Deutsche Med. Wochenschr.*, p. 1673, 1905) presented the advantage of relatively long persistence of the separation layer, facilitating the detection of ring formation, but here again no indication could be obtained of differences in precipitation capacity between the normal and immune sera.

AYERS (T. T.). **Growth of Dispira cornuta in artificial culture.**—*Mycologia*, xxv, 5, pp. 333–341, 1 pl., 1933.

Dispira cornuta, hitherto regarded as an obligate parasite on members of the Mucorales, was successfully grown to sporulation by the writer in artificial culture on a number of media of animal origin, of which the most suitable were egg in various forms, beef, and swordfish. On vegetable products it failed to grow, while in

liquid media prepared from meat (e.g., nutrient broth, peptone, and the like) it grew but did not sporulate.

RIVERA (V.). **Azione a distanza di metalli. (Prove con Penicillium crustaceum).** [The action of metals at a distance. (Tests with *Penicillium crustaceum*).]—*Atti Pont. Accad. Sci. Nuovi Lincei*, lxxxvi, pp. 184–188, 1933.

Continuing his researches into the effects of radiation upon the growth of plant tissues [*R.A.M.*, xii, p. 82] the author placed Petri dishes containing spores of *Penicillium glaucum* [given in the title as *P. crustaceum* but throughout the text as *P. glaucum*] sown on meat broth agar in zinc, iron, and lead containers kept under similar conditions. Five and a half days later conidia were being actively produced in the lead container, but there was no sign of sporulation in either of the others.

Lead, therefore, acts in the same way on lower as on higher plants in stimulating cellular multiplication. This action is thought possibly to be due to 'secondary radiation' set up by the wall of the container, the intensity of which increases with the atomic weight of the metal.

RIVERA (V.). **Ancora sull'azione biologica dei metalli a distanza.** [Further notes on the biological action of metals at a distance.] —*Atti Pont. Accad. Sci. Nuovi Lincei*, lxxxvi, pp. 240–242, 1933.

The author's investigations into the effect of radiation on the growth of normal and abnormal plant tissues [see preceding abstract] have shown that metal containers, especially when of high atomic weight, stimulate growth when the organism is placed at a distance of a few centimetres from the metal. This effect is diminished, so far, at least, as the lower organisms are concerned, when small containers are used, and becomes transformed into a depressive effect when the container is very small. Whether the effect of such radiation is stimulating or depressive therefore depends on the dosage (i.e., distance of the metal or secondary source of radiation from the organism), and probably also on the kind of organism tested.

KLAPP (E.). **Der Abbau der Kartoffel als Folge von Leistungsüberspannungen.** [Potato degeneration as a sequel to overtaxation of the productive capacity.]—*Pflanzenbau, Pflanzenschutz u. Pflanzenzucht*, x, 4, pp. 129–146; 5, pp. 161–197, 1933.

Continuing to develop his theory of an ecological basis for potato degeneration [*R.A.M.*, xii, p. 461], the writer considers that the natural constitution and habits of the plant have been subjected to far-reaching disturbances with a view to securing greater productivity. Originating in the mountains, the potato tends naturally to a comparatively short growing period followed by a lengthy winter rest, and cannot be indefinitely maintained in a healthy state under the exactly opposite conditions required for commercial cultivation. Among the factors promoting long duration or intensity of vegetation and thus indirectly favouring

degeneration are a mild climate with a long summer and an abnormally warm and protracted autumn; damp, heavy, fertile soils; and cultural practices aiming at early maturity and high yields.

BOTJES (J. G. O.). **Verzwakking van het virus der topnecrose, en verworven immuniteit van Aardappelrassen ten opzichte van dit virus.** [Attenuation of the virus of top necrosis and acquired immunity of Potato varieties in respect of this virus.] —*Tijdschr. over Plantenziekten*, xxxix, 10, pp. 249–262, 1 pl., 1933.

The grafting of tuber cores of apparently healthy Duke of York, Magdeburger Blaue, Jaune d'Or, Irish Cobbler, and Green Mountain potatoes on the Bravo, Bloemgraafje, Paul Kruger [President], Bevelander, and Industrie varieties causes the development in the latter of top necrosis (acronecrosis) [*R.A.M.*, x, p. 746; xii, p. 319]. The severe form of the disease, typified by necrotic lesions on the upper leaflets, death of the growing points, and internal necrosis of the stems and tubers is designated 'primary top necrosis'. During the process of growth the core-grafted plants make a partial recovery which extends still further in the asexual progeny. During four years' observations at Wageningen, Holland, the only symptoms exhibited by the latter were interveinal mosaic and some spotting of the middle and lower leaves ('secondary top necrosis'). In some cases, indeed, recovery was virtually complete, the sole trace of the original infection consisting in a faint interveinal mosaic or 'attenuated secondary top necrosis'. This condition is transmissible by further grafting, the resultant symptoms being more or less marked in different varieties. The grafting of Duke of York, Magdeburger Blaue, Jaune d'Or, Irish Cobbler, and Green Mountain on Zealand Blue results, not in top necrosis, but in mosaic which persists unchanged in the asexual progeny. When the latter are grafted on Bravo, Bloemgraafje, and Industrie primary top necrosis ensues.

KATTERMANN (G.) & WENK (H.). **Ein neuer Phytophthorabiotyp auch in Bayern?** [A new *Phytophthora* biotype also present in Bavaria?]—*Der Züchter*, v, 6, pp. 129–132, 1933.

Since 1927 work on the breeding of potatoes for resistance to *Phytophthora infestans* has been in progress at the Bavarian Seed Breeding Institute, Weihenstephan. In that year five tubers of each of the resistant strains Ef xii, 2 × Polanin a and Ef xii, 2 × Polanin b (subsequently classified in the collection of the Institute as P1 and P6, respectively), were received for further cultivation from the Biological Institute, Berlin. In the same year P1 was crossed with a hybrid between two commercial varieties (Blochinger × Hindenburg), while in 1928 numerous crosses were made in which the resistant strains supplied the pollen and the early commercial varieties Erstling [Duke of York] and Juli the stigmas. The resultant progenies were designated EP and JP and, like those of the foregoing cross, were exposed to spontaneous infection in the field. From 1930–2 artificial inoculation experiments were carried out on a large scale, involving 5,000 seedlings in 1931 and over 20,000 in 1932, the results of which showed that, even under the very exacting conditions of the tests, the P, EP, and JP strains

were giving a good percentage of highly resistant seedlings, in which even though infection spots developed in the autumn there was no spread of the fungus in the tissues and no sporangia were produced. However, at the end of August, 1932, all the resistant strains and their progeny were attacked in a destructive form by blight, which by that date had been prevalent for some time on the neighbouring susceptible varieties. Apparently a new biotype of the fungus [*R.A.M.*, xiii, p. 53] had appeared. In the normal work of the station it is customary to grow varieties received each year for testing from various places, including v. Kameke's Streckenthin seedlings, and the latter are believed to have introduced the new biotype. Weight is lent to this hypothesis by the fact that the foci of infection occurred mainly in the plots adjacent to Streckenthin material, as well as by the simultaneous outbreak of a late blight epidemic at a branch station of the Bavarian Seed Breeding Institute in the Danube Valley where experimental work with plants of the same suspected origin is also in progress. Other branch stations in the vicinity of Munich remained unaffected by the new biotype, which has evidently, therefore, only recently been introduced on Streckenthin material.

Cairns (H.) & Muskett (A. E.). **Pink rot of the Potato.**—*Ann. of Appl. Biol.*, xx, 3, pp. 381–403, 1 pl., 1 map, 1933.

Investigations conducted from 1927 to 1932 in Northern Ireland into pink rot of potato tubers (*Phytophthora erythroseptica* and *P. megasperma*) [*R.A.M.*, ix, p. 225; xii, p. 466] showed that sometimes the disease may be systemic in the plant, causing 'misses' and 'pink rot wilt' in the crop. Under conditions of high humidity and poor ventilation heavy losses (up to 50 per cent.) from pink rot may be sustained during storage. In the field tuber infection normally occurs through the mother stolon, but in moist conditions either in the field or in storage the tubers become infected directly, generally through the eyes. In one case recorded almost the entire crop was destroyed. The numerous oospores produced by *P. erythroseptica* in the haulms, stolons, and also, to some extent, in the roots of dead potato plants become disseminated and greatly increase the prevalence of the fungus in the soil, though in most cases the percentage of the crop affected is small. Even in the absence of the host it appears that the fungus may persist indefinitely in the soil. Inoculation experiments showed that *P. cryptogea* and *P. cactorum* could also cause typical pink rot.

Satisfactory crops can be grown in contaminated soil if strongly sprouted tubers are planted and the soil is well drained. Early harvesting and dry, well-aerated storage conditions also greatly reduce the risk of serious losses.

Napper (R. P. N.). **Report on diseases of the Rubber tree in Kedah.**—*Journ. Rubber Res. Inst. Malaya*, v, 1, pp. 35–47, 1933.

In this brief report of his extensive tour in February 1933 of the main *Hevea* rubber growing districts of the State of Kedah, the author gives some notes on the chief diseases observed by him affecting the roots, stems, branches, and tapping panel of *Hevea*

rubber trees, most of which are well known to rubber pathologists. The problems presented by these diseases are discussed, particularly in their relation to the local climatic conditions, and the paper terminates with a few considerations of general interest to the local rubber growers.

BEELEY (F.). **Oidium heveae. Report on the 1933 outbreak of Hevea leaf mildew.**—*Journ. Rubber Res. Inst. Malaya*, v, 1, pp. 5–13, 5 graphs, 1 map, 1933.

The author states that in the spring of 1933 reports of *Hevea* mildew (*Oidium heveae*) [*R.A.M.*, xii, p. 323] outbreaks in Malaya came chiefly from the coastal districts of Negri Sembilan and Malacca, where light rains during the early part of March caused a rapid and almost epidemic spread of the disease. The attack ended about the first week in April, and the recovery towards the end of that month was remarkably good, owing probably to the onset of regular, fairly heavy rains. Observations indicated that while trees of all ages may be attacked by the mildew, the older trees suffer more severely than the younger, and also that the inflorescence is still the favourite site for the fungus. The paper terminates with a brief discussion of control measures, most of the experiments on which have already been noticed in this *Review* from other sources.

SHARPLES (A.). **Lightning damage in Rubber plantations.**—*Journ. Rubber Res. Inst. Malaya*, v, 1, pp. 22–28, 4 figs., 1933.

This paper is stated to be largely a reproduction of the information given in a previous communication concerning the significance of lightning injury to *Hevea* rubber plantations in Malaya, an abstract from which has already been published in this *Review* [*R.A.M.*, xii, p. 507].

BAYLISS ELLIOTT (JESSIE S.). **Some soil fungi of Hartlebury Common.**—*Proc. Birmingham Nat. Hist. & Phil. Soc.*, xvi, 4, pp. 93–100, 9 figs., 1933.

Taxonomic notes are given on two of the nine fungi isolated from the soil of Hartlebury Common, near Stourport [Worcestershire] in 1931, viz., *Volutella roseola* and *Pistillaria quisquiliaris*. A detailed study of bread agar cultures of the former revealed it as the sporodochial stage of a *Cephalosporium* indistinguishable from *C. acremonium*. Among the other organisms found were *Penicillium roseum* (*P. hypomycetis*) and *Periconia felina*, also reported from the salt marshes of the Dovey Estuary [Wales: *R.A.M.*, ix, p. 740].

ARCENEAUX (G.), STOKES (I. E.), BISLAND (R. B.), & KRUMBHAAR (C. C.). **Variety tests of Sugarcanes in Louisiana during the crop year 1931–32.**—*U.S. Dept. of Agric. Circ.* 298, 31 pp., 1933.

The immense losses (amounting to over $100,000,000) caused by sugar-cane mosaic in Louisiana during the decade just completed are attributed by the writers to the absence, in the early stages of the epidemic, of disease-resistant varieties adapted to local condi-

tions, the development of which is also of importance in connexion with the red rot [*Colletotrichum falcatum*: *R.A.M.*, xii, p. 724] and root rot [ibid., ix, p. 132] problems. Their production became an aim of primary importance, therefore, when breeding and varietal testing work was undertaken by the Division of Sugar Plant Investigations of the Bureau of Plant Industry.

During 1931–2 C.P. 807 (a Canal Point, Florida, seedling variety) has consistently outyielded the former favourite P.O.J. varieties 213, 234, and 36-M by 10 tons or more of cane per acre, besides showing resistance to the above-mentioned diseases (immunity from mosaic and high resistance to root diseases, in particular)—qualities entirely outweighing certain less desirable characters such as crooked stems and rather high fibre content. Co. 281 has manifested an increasing susceptibility to mosaic [ibid., xii, p. 786] but resists all the strains (except one) of *C. falcatum* [ibid., xii, p. 724], particularly the dominant strain attacking P.O.J. 213. In the opinion of pathologists this variety, though possibly less valuable than was originally believed, is worthy of extended cultivation in the immediate future on account of its many superior qualities. The extreme susceptibility of P.O.J. 213 to red rot, except under almost ideal soil conditions, renders its cultivation in Louisiana very hazardous. Co. 290 has not been so fully tested as C.P. 807 or Co. 281, but it has qualities which may make it a very advantageous variety for local cultivation.

Ocfemia (G. O.), Hurtado (E. A.), & Hernandez (C. C.). **Distribution of mosaic and Fiji diseases in Sugar Cane stalks; effects of these maladies on the germination of the eyes and transmission of the viruses by pin pricks.**—*Philipp. Agric.*, xxi, 6, pp. 385–407, 6 figs., 1933.

In the Philippine Islands Fiji disease of sugar-cane has been found to be transmitted by *Perkinsiella vastatrix* Breddin, the first records of the successful experiments of Ocfemia with this insect having appeared in the *Philippine Agriculturist* and in the *Sugar News* (Manila) for October and November, 1932, respectively, while a detailed report on the work is in the press. In Australia *P. saccharicida* is stated to be the vector [ibid., xii, p. 787] so that probably several species of allied insects can transmit the disease. Germination tests with one-node cuttings of 16 commercial varieties of native and imported canes showed that both mosaic and Fiji disease are distributed throughout the stalks of the infected plants. Every shoot arising from the buds of all the mosaic P.O.J. stalks used in these trials proved to be infected, the occasional apparent absence of leaf mottling in some of them being merely due to masking [ibid., xii, p. 245], as was shown by the fact that they proved capable of transmitting infection to healthy plants. All the shoots from Fiji-diseased cane showed the disease. It was found that in some varieties the percentage of eye germination was reduced by mosaic and Fiji disease, while in others the healthy plants produced fewer eyes than the infected ones, indicating that germination is influenced by some factor independent of the diseases under observation.

Experiments in the artificial transmission of mosaic by juice

inoculations through pin pricks proved successful in a large number of cases, but similar attempts to transmit Fiji disease failed.

UNAMUNO (L. M.). **Notas micológicas. VI. Algunas especies nuevas o poco conocidas de la micoflora española.** [Mycological notes. VI. Some new or unfamiliar species of the Spanish mycoflora.]—*Bol. Soc. Española Hist. Nat.*, xxxiii, 6–7, pp. 221–235, 6 figs., 1933.

Continuing his series of taxonomic observations on fungi collected in different parts of Spain [*R.A.M.*, xii, p. 330], the writer enumerates 32 species (including four new ones), of which the following may be mentioned. *Alternaria tenuis* f. *genuina*, characterized by 3- to 5-septate, dark olivaceous conidia, 27·5 to 50 or up to 62·5 by 12 to 17·5 μ, was found on the leaves, peduncles, floral buds, and unripe fruits of *Capsicum annuum* (a new host for Spain) in Valencia, where heavy losses have been caused by the fungus during the past few years. The species under observation is quite distinct from *A. solani*, previously reported on the same host [ibid., xii, p. 354]. *C. annuum* fruits in the same province are also liable to infection by *Gloeosporium capsici* n. sp., a species characterized by large, whitish-yellow acervuli, a brown, parenchymatous basal stroma of round to polygonal cells 8 to 20 μ in diameter, and cylindrical, straight or slightly curved, hyaline to yellow, densely granular conidia, rounded at both ends or pointed at one, 18 to 23 by 6 to 7·5 μ, borne on filiform, simple, hyaline conidiophores, 25 to 32 by 5 to 6 μ. *Lolium perenne* and *L. rigidum* leaves in Logroño were attacked by *Puccinia glumarum*, the latter a new host for the country. *P. glumarum* f. *bromicola* was observed on *Bromus maximus* and *B. rubens*, the latter bearing some biseptate teleutospores. *Uromyces renovatus* occurred on the leaves of *Lupinus hirsutus* (a new host) in Seville.

OVERHOLTS (L. O.). **Mycological notes for 1930–32.**—*Mycologia*, xxv, 5, pp. 418–430, 3 pl., 1933.

In continuation of previous notes of the same series [cf. *R.A.M.*, x, p. 130], the writer describes 34 species of fungi (one new), mostly from Pennsylvania. *Fusicoccum persicae* Ell. & Ev., with spores measuring 20 to 24 by 4 to 6 μ (slightly larger than the dimensions originally given), was found causing the death of peach twigs, the injury on which was similar to that associated with *Valsa leucostoma* [ibid., x, p. 41].

Septoria sibirica on *Ribes vulgare* has been confused in its immature stages with *Cylindrosporium ribis*. It differs from *S. ribis* [*Mycosphaerella grossulariae*] in the smaller dimensions of the pycnidia (30 to 45 μ in diameter) and the considerably longer spores (21 to 75 by 2 μ).

VERWOERD (L.) & DU PLESSIS (S. J.). **Descriptions of some new species of South African fungi and of species not previously recorded from South Africa. V.**—*S. African Journ. of Sci.*, xxx, pp. 222–233, 1933.

Critical and taxonomic notes are given on 29 species of fungi

(continuing a previous list) [*R.A.M.*, xii, p. 192] not hitherto recorded from South Africa, of which nine are considered to be new to science and are accompanied by English and Latin diagnoses. *Ascochyta kentiae* produces pale grey, coalescent spots with a narrow, brown margin on the leaves of *Oreodoxa regia*, killing them from the tip downwards. *Colletotrichum brachytrichum* was identified as the agent of a grey to light brown spotting of cacao leaves, which are also liable to infection by *Phyllosticta theobromae* [ibid., ix, p. 632]. *C. orchideaurum* produces irregular lesions with an indefinite, yellowish halo on the leaves of *Cryptopodium punctatum*. The leaves of *Ribes vulgare* are attacked by *Cylindrosporium ribis* [see preceding abstract], producing semicircular to elliptical, slightly sunken, pale grey spots with a dark brown margin. The leaves of *Coelogyne cristata* are destroyed by *Gloeosporium affine* [ibid., vi, p. 617], the olive-green to light brown lesions due to which are surrounded in the later stages by a broad olive-green margin. Cinnamon (*Cinnamonum zeylanicum*) leaves are infected by *Leptosphaeria cinnamomi*, producing circular to elongated, irregular, sometimes marginal, brownish-grey spots with a narrow, dark margin.

Septoria avenae [ibid., ix, pp. 225, 625] produces elongated to lenticular, pale greyish-brown spots with a broad purplish margin on oat leaves at Stellenbosch and in the Malmesbury and Moorreesburg districts.

The death of *Lantana camara* shoots is caused by *Phoma lantanae* n. sp., characterized by subepidermal, erumpent, globose to depressed-globose pycnidia, 80·6 to 155·2 by 71 to 145·6 μ; and hyaline, smooth, muticate, continuous, elliptical to ovoid conidia, 3·4 to 6·1 by 1·2 to 1·8 μ, borne on hyaline, simple conidiophores, 5·1 to 9·7 μ long, sharply tapering towards the apex. *Pyrenochaete vanillae* n. sp. produces marginal, sunken, dark brown, later grey spots, surrounded by a yellow halo, on the leaves of *Vanilla planifolia* which are killed by the infection. The amphigenous, subepidermal, erumpent, subglobose to depressed-globose pycnidia, 71 to 134·9 μ in diameter, are surrounded by dark brown, aseptate setae at the apex, which measure 25·5 to 59·5 by 3·5 to 5 μ; the hyaline, smooth, muticate, continuous, ovoid to elliptical pycnospores measure 6·8 to 11·7 by 1·2 to 1·8 μ; the conidiophores are hyaline, irregularly branched, slender, and 10·3 to 15·8 by 0·9 to 1·8 μ in diameter.

Du Plessis (S. J.). **Descriptions of some new species of South African fungi and of species not previously recorded from South Africa. VI.**—*S. African Journ. of Sci.*, xxx, pp. 206–211, 1933.

Critical and taxonomic notes are given on eleven species of fungi not hitherto recorded from South Africa [see preceding abstract], of which five are considered to be new to science and are accompanied by English and Latin diagnoses. *Coniothyrina agaves* (Dur. & Mont.) Pet. & Syd. [*R.A.M.*, ix, p. 561] was found producing whitish-grey lesions of irregular extent on the leaves of *Agave americana*, which ultimately died as a result of the infec-

tion. *Pleospora herbarum* was observed in association with the *Sphaeropsis* stage of *Macrophoma aloës* on dead leaves of *Aloë* sp.

ZUNDEL (G. L.). **New and rare North and South American Ustilaginales.**—*Mycologia*, xxv, 5, pp. 349–355, 1933.

An annotated list is given of five rare and eight new species of smuts from the western United States and Brazil occurring on various Gramineae [cf. *R.A.M.*, ix, p. 744]. The new species are accompanied by Latin diagnoses.

ARTHUR (J. C.). **New genera and species of Uredinales.**—*Bull. Torrey Bot. Club*, lx, 7, pp. 475–476, 1933.

In this brief note the author establishes, among others, the new genus *Cumminsiella* [with a Latin diagnosis] to include three fungi on *Mahonia* [*Berberis*], namely, *C. sanguinea* (Peck) Arth. nov. comb. (*Puccinia mirabilissima* [*R.A.M.*, xii, p. 578], *Uromyces sanguinea* Peck (1879), *Uropyxis mirabilissima*, and *U. sanguinea*), *C. wootoniana* nov. comb. (*U. wootoniana*), and *C. texana* (Holw. & Long) Arth. nov. comb. (*P. texana*, *U. texana*, and *Aecidium butlerianum*). This genus separates from *Uropyxis* those species having subepidermal pycnidia and cupulate aecidioid aecidia.

ARTHUR (J. C.) & CUMMINS (G. B.). **Rusts of the Northwest Himalayas.**—*Mycologia*, xxv, 5, pp. 397–406, 1 fig., 1 map, 1933.

An annotated list is given of 89 rusts comprising 165 collections made by R. R. Stewart in the North-western Himalayas (Punjab, Kashmir, North-west Frontier Province, and near Mussoorie, United Provinces, India), including five new species [with Latin diagnoses] and two new combinations. Twenty species of rusts and 34 hosts do not appear in previous lists of Indian fungi [*R.A.M.*, xi, p. 545; xii, p. 395], and are considered to be new records for the country.

Aecidium orbiculare, found on *Clematis connata*, *C. grata*, and *C. montana*, approximates closely in morphological characters to the aecidial stage of *Puccinia rubigo-vera* [see next abstract], and may be referable to that species, which occurred on *Aquilegia pubiflora*, *A. vulgaris*, *Thalictrum minus*, *T.* sp., and *Triticum* sp., the first- and third-named being new hosts.

Cronartium ribicola was detected on a new host, *Ribes orientale*, in Kashmir [cf. ibid., viii, p. 78].

The twigs and leaves of *Cotoneaster bacillaris* and *C. rosea* showed extensive malformations due to infection by *Gymnosporangium distortum* n. sp., the pycnidia and aecidia of which are scattered over the diseased area.

Rosa (?) *webbiana* was attacked by *Phragmidium kamtschatkae* (Anders.) Arth. & Cumm. comb. nov. (*Puccinia rosae* Barclay 1889). The latter name is antedated by Persoon (1801), so that *P. kamtschatkae* Anders. becomes the first valid name for this species. Tranzschel's *Phragmidium rosae* (1928) is antedated by Rostrup's use of this combination for *P. disciflorum* (Tode) James.

Lettuce (*Lactuca* (?) *decipiens*) was infected by *Puccinia opizii* [ibid., xiii, p. 10].

MAINS (E. B.). **Studies concerning heteroecious rusts.**—*Mycologia*, xxv, 5, pp. 407–417, 1933.

Critical and taxonomic notes are given on ten species (one new) of heteroecious rusts from various parts of the United States, which were studied in connexion with the investigations on the leaf rust of grasses (*Puccinia rubigo-vera*) already reported [*R.A.M.*, xii, p. 499]. Inoculation experiments on *Berberis fendleri* with the teleutospores of *P. koeleriae* from *Koeleria cristata* in 1920 resulted in profuse infection, sometimes causing the formation of a compact rosette of leaves bearing pycnidia and aecidia. Well-developed uredo- and later teleutosori were produced on *K. cristata* and *Trisetum sesquiflorum* following inoculation with the aecidia of *P. koeleriae* from *B. fendleri*. *P. koeleriae*, *P. arrhenatheri* [ibid., xii, p. 506], and *P. montanensis* all produce their aecidial stages on species of *Berberis* or *Mahonia*, suggesting the possibility that, as these rusts form a connected series with *P. glumarum*, these two genera may also be aecidial hosts of the latter.

LINDER (D. H.). **The genus Schizophyllum. I. Species of the western hemisphere.**—*Amer. Journ. of Botany*, xx, 8, pp. 552–564, 4 pl., 1933.

Six species of *Schizophyllum* from the western hemisphere are described, figured, and their synonymy listed, the two new ones, *S. brevilamellatum* from Venezuela and *S. leprieurii* from French Guiana (both on dead wood) being furnished with Latin diagnoses. All occur in the tropics except *S. commune* [*R.A.M.*, xi, pp. 84, 318], which appears to be rare in tropical regions. *S. radiatum* (Swartz) Fr., originally described from Jamaica, is stated to be parasitic on sugar-cane.

VERONA (O.). **Sulla sistematica delle 'Mycotoruleae' Cif. et Red.** [On the systematic grouping of the Mycotoruleae Cif. et Red.]—*Nuovo Giorn. Bot. Ital.*, N.S., xl, 2, pp. 225–229, 1 pl., 1933.

In this revision of the genera of the sub-family Mycotoruleae Cif. et Red. of the Torulopsidaceae the author accepts in general the conclusions of Ciferri and Redaelli [*R.A.M.*, v, p. 229; viii, p. 676; xi, p. 642], but proposes that *Eumycotorula* n. subgen., *Enantiothamnus*, and *Mycotoruloides* should be considered as subgenera of *Mycotorula*, and he divides *Candida* similarly into two subgenera, *Eucandida* and *Mycocandida*, differing chiefly in the greater mycelial development and more prominent verticils of the latter.

FISHER (EILEEN E.). **The 'sooty moulds' of some Australian plants.**—*Proc. Roy. Soc. Victoria*, N.S., xlv, 2, pp. 171–202, 1 pl., 18 figs., 1933.

In this account of her investigations into the sooty moulds of indigenous Australian plants the author states that on the leaves of *Bursaria spinosa* the mould consisted of a mixture of fungi forming a definite association. She observed sessile, spherical, glabrous perithecia containing asci and muriform ascospores and agreeing with those of herbarium specimens determined by McAlpine as *Capnodium walteri*, a species described on the same host from

Australia by Saccardo. These perithecia, however, are quite different from the flask-shaped perithecia with long necks and protruding asci with phragmosporous ascospores described and figured by Saccardo, who apparently confused pycnidia with perithecia, pycnidia and pycnospores resembling the perithecia and ascospores of Saccardo being also present in the author's material and referred by her to the form genus *Hendersoniella*. A second pycnidial form, referred to *Chaetophoma*, also occurred in the material examined, but in single ascospore cultures only the first type developed. The conidial stage of a *Phycopsis* was also present, which from its distinct cultural characters was evidently unconnected with the perithecial form; a similar conidial form is stated to occur commonly on leaves attacked by various Capnodiaceae. *Macrosporium* and *Cladosporium*-like spores were also present, but not obtained in culture from the ascospores or pycnospores. It is concluded that the sooty mould on *Bursaria* consists of several fungi, the perithecial form with elongated pycnidia being determined as *Capnodium salicinum*, the correct name for which the author, in agreement with Arnaud, considers to be *Teichospora salicina* (Mont.) Gäum.

On *Leptospermum scoparium* the sooty mould consisted of a mixture of two perithecial forms, various pycnidial types (*Chaetophoma*, *Hendersoniella*, *Microxyphium*, &c.), sterile forms, and forms represented by conidial (*Cladosporium*, *Dematium*) stages only. One type of perithecium was glabrous, spherical, borne on a stalk and usually solitary, with a thick, black, carbonaceous wall, and contained asci with brown, muriform, 3-, later 5- to 6- septate ascospores. This type was similar in many respects to that figured for *Capnodium australe* Mont., and also resembled *C. cistophilum* Fr. The second type was spherical, sessile, glabrous, borne terminally on beaded hyphae, and outwardly resembled the pycnidia of *Chaetophoma* but contained asci and hyaline, bicellular, probably immature ascospores. The muriform-spored perithecial form is referred to *C. australe*, the more correct name for which is *T. australe* (Mont.) Arnaud. Maire figured only unbranched perithecia in his account of *C. cistophilum*, but as branched perithecia were rare in the author's fungus and the ascospore measurements and figures given by Maire closely agree with those of the immature ascospores of *T. australe*, the name *C. cistophilum* is included as a synonym. No cultural evidence was obtained of the genetic connexion of the perfect with the imperfect forms found in this mould.

On *L. laevigatum* the mould was also due to a mixture of fungi. Inoculations from infected material gave cultures consisting of a densely black growth belonging to *Chaetophoma* and identical with that from *B. spinosa* and *L. scoparium*, an unidentified white form possibly associated with a *Phycopsis*, and a dark olivaceous perithecial form identified at the Imperial Mycological Institute as *Pleospora herbarum*. An abundant development of perithecia occurred in cultures on honey agar (the medium chiefly used in the author's work), but the conidial stage, *Macrosporium sarcinula*, was produced only on *Myoporum* agar and on synthetic media in which ammonium sulphate or ammonium nitrate was used as a source of

nitrogen. The brown muriform ascospores had seven transverse septa. The connexion between *M. sarcinula* and *P. herbarum* was confirmed by cultural work.

On *Myoporum insulare* [*M. serratum*] the only sooty mould fungus observed in nature was a *Phycopsis*.

On *Melaleuca* sp. the sooty mould was composed of *Limacinia fuliginodes*, this being the first Australian record of this fungus. The name *L. melaleucae* nomen nudum appears to have been used in 1899, but from the examination of McAlpine's type material of this fungus in comparison with descriptions of *Limacinia* recorded by Saccardo it was identified by the author as *L. crassa* (Pat.) Sacc. The perithecial stage of *T. australe* and mucilaginous cushions of *Phycopsis* sp. without propagula were also associated with the mould on this host.

A bibliography of 37 titles is appended.

SMITH (G.). **Some new species of Penicillium.**—*Trans. Brit. Mycol. Soc.*, xviii, 1, pp. 88–91, 2 pl., 1933.

Notes are given on four new species of *Penicillium*, three of which were isolated during an investigation conducted in 1927–9 of the fungal infections of manufactured cotton goods, while the fourth was obtained in 1931 by the late J. H. V. Charles from mouldy Italian maize. Of the cotton organisms, *P. pallidum* n. sp. and *P. varians* n. sp. were obtained from yarn showing no sign of mildew, and are regarded as part of the latent infection usually carried by cotton, while *P. raistrickii* n. sp. was isolated from mouldy yarn, and was responsible for part, at least, of the damage. The remaining organism, *P. charlesii* n. sp., is stated to show unique biochemical reactions. The cultural characters of the four species are described and Latin diagnoses are given.

MANDELSON (L. F.). **Tobacco diseases. *ex* Tobacco growing in Queensland.**—*Queensland Dept. of Agric. & Stock*, pp. 48–76, 8 pl., 1933.

This information on tobacco diseases occurring in Queensland and elsewhere has already been noticed from another source [*R.A.M.*, xi, p. 76] and is also issued in the form of a Pathological Leaflet (No. 22 of the Queensland Department of Agriculture and Stock).

PRICE (W. C.). **The thermal death rate of Tobacco-mosaic virus.**—*Phytopath.*, xxiii, 10, pp. 749–768, 2 graphs, 1933.

Using the local lesion method for measuring virus concentration [*R.A.M.*, ix, p. 810; xi, p. 526, *et passim*], the writer found that the undiluted juice of ordinary mosaic tobacco (Johnson's tobacco virus 1) was inactivated in one minute at 96° C., in ten at 93°, in 80 at 90°, in 32 hours at 85°, in 12 days at 80°, and in 40 at 75°. Virus in juice of mosaic tobacco plants diluted 1:20 with water was completely inactivated in one minute at 92°, in ten at 88°, in 70 at 85°, in 13 hours at 80°, in 72 at 75°, and in 20 days at 68°. Thermal death point determinations made with virus in juice diluted with water or with healthy tobacco extract indicate that

the inactivation process is influenced by the concentration of virus and solids in the dispersing medium.

WOLF (F. A.). **Roguing as a means of control of Tobacco mosaic.** —*Phytopath.*, xxiii, 10, pp. 831–833, 1933.

The writer's observations in North Carolina from 1928–30 indicated that healthy tobacco plants, set in fields that had carried a mosaic-infected crop the previous year, do not ordinarily show more than a small proportion of diseased plants at the time of the first cultivation. Under such conditions early roguing is an effective check to the spread of mosaic. On the other hand, the roguing of fields planted with seedlings from infested seed-beds is inadvisable, since it necessitates the removal of too large a proportion (10 per cent. and upwards) of infected plants.

WOLF (F. A.) & MOSS (E. G.). **Effect of mosaic of flue-cured Tobacco on yield and quality.**—*Phytopath.*, xxiii, 10, pp. 834–836, 1933.

The results of experiments at Oxford, North Carolina, in 1929–30 showed that both the yield and quality of flue-cured tobacco are adversely affected by mosaic, the extent of the damage depending on the stage of growth at which infection takes place [*R.A.M.*, vii, p. 123; viii, p. 533]. Thus, the two-year average yield of the plot inoculated at setting time was 655 lb. compared with 1,000 lb. from the healthy plot—a decrease in quantity of 31·4 and in value of 54·6 per cent. The corresponding figures on the plot inoculated about a month after transplanting were 692 lb., 30·1, and 42·1 per cent., respectively, and on that inoculated at topping time, 825 lb., 17·2, and 23·8 per cent., respectively. Judging by three seasons' observations, the writers conclude that mosaic is seldom as destructive under natural conditions as on the two earliest inoculated experimental plots above-mentioned, but there may well be an average incidence of 20 per cent. mosaic at topping time, resulting in a decrease of yield and value exceeding that shown by the third plot.

BUSCH (H. J.) & WOLF (F. A.). **Manufactured Tobacco, a source of inoculum for mosaic in flue-cured Tobacco.**—*Phytopath.*, xxiii, 10, pp. 839–841, 1933.

In 1929 the virulence of samples of 45 brands of manufactured tobacco was tested by their application to healthy tobacco leaves. After 12 to 18 days some of the plants inoculated with two brands of chewing tobacco and two of snuff showed symptoms of mosaic, while those infected by the remaining 41 failed to contract the disease. Chewing tobacco made from mosaic leaves and applied after curing to the healthy foliage of potted plants either as spittle or by sprinkling after soaking in water caused infection in about a fortnight. It is apparent from these tests, the results of which agree with those of Valleau and Johnson [*R.A.M.*, vii, p. 124] and Fukushi [ibid., x, p. 694], that the mosaic virus persists in occasional samples of certain brands of manufactured tobacco.

Samuel (G.) & Bald (J. G.). **Tomato spotted wilt on Tobacco.**—*Journ. Dept. Agric. S. Australia*, xxxvii, pp. 190–195, 6 figs., 1933.

In South Australia tomato spotted wilt [*R.A.M.*, xi, p. 549 ; xii, p. 730] though usually present only on isolated tobacco plants is a common disease of this crop, to which it is transmitted by *Frankliniella insularis* and *Thrips tabaci* [ibid., xi, p. 78]. On tobacco, the symptoms [cf. ibid., xi, p. 608] consist of necrotic spots on the younger leaves, necrotic areas along the lateral veins, usually on the lower half of the leaf, and often on one side only, a characteristic mottle due to the invasion of all the fine veins in the lower half of the leaf (there being usually in this case a coarser pattern bordering the veins immediately above the area fully invaded), and various combinations of these symptoms, as well as irregular necrotic spots and line patterns. The colour changes vary from yellowish-green in the mottled area to reddish-brown or white in the necrotic spots and lines. The top of an affected plant ceases growth and in the early stages may be slightly bent over to one side. Dark sunken streaks may appear on the stem, and dark necrotic areas or cavities may be found in the cortex or pith. Infected plants remain at a standstill for some weeks, after which the leaves droop and die and the plant soon succumbs. Occasionally, instead of dying the plants develop a distorted secondary growth, and new, almost normal, leaves may form, but are in turn liable to develop necrotic symptoms.

Control consists in removing other susceptible hosts [ibid., xi, p. 549] from the vicinity of the tobacco and burying infected material as soon as detected.

Manil (P.). **Contribution à l'étude d'une maladie bactérienne du Tabac, constatée en Belgique.** [A contribution to the study of a bacterial disease of Tobacco observed in Belgium.]—*Bull. Inst. Agron. et des Stat. de Recherches de Gembloux*, ii, 3, pp. 244–268, 3 pl., 1933. [Flemish, German, and English summaries.]

In July 1932, from 2 to over 90 per cent. of the tobacco growing in some of the plantations in the valley of the Semois, south-eastern Belgium, were attacked by the disease resembling wildfire (*Bacterium tabacum*) previously reported from this locality [*R.A.M.*, xii, p. 7]. Healthy fields were seen in close proximity to diseased ones, and diseased and healthy patches sometimes occurred in one and the same field, though the conditions were apparently identical throughout. Spread occurred by leaf contact and probably also by insect transmission, and ceased about the middle of August. In the parts most severely affected the value of the crop was reduced by 30 per cent. The disease was also noted at Mons, Tournai, and Poperinghe.

The symptoms consisted in smooth, pale- to yellowish-brown spots, 1 to 2 mm. in diameter and with a yellow halo averaging 0·5 cm. wide, scattered over the lower leaves, and later coalescing into dry, translucent, sometimes perforated areas. The presence or absence of the halo and its duration when present were very variable, largely depending on the variety.

A bacterium was isolated, needle-prick inoculations with which gave nearly 100 per cent. positive results. Experimental infections were also obtained by means of *Aleurodes* [*Trialeurodes*] *vaporarium* and a *Macrosiphum*. This organism resembled *Bact. angulatum* [cf. ibid., x, p. 62] except that it did not produce indol, and *Bact. tabacum* except that it did not coagulate milk. In litmus milk it produced a violaceous blue ring which gradually rose above a series of increasingly lighter rings; after 11 days clarification was visible in the lower part, while in 3 days the P_H value rose from 6·52 to 6·94. The production of acids with glucose was very weak. The P_H value of 4 per cent. meat broth agar was reduced in 6 days from 6·51 to 6·26. In Cohn's medium the organism grew well and showed the characters of *Bact. melleum* as described by Săvulescu [ibid., ix, p. 207]. In glucosed alkaline liquid media growth occurred only on the surface. The organism resisted desiccation for 10 to 12 days; its virulence remained unaffected after exposure to 50° for 10 minutes, but death ensued after 72 hours at 37°. No reduction in virulence was noted after one year's growth on meat broth agar (12 transfers).

From the close similarity of the symptoms with those of wildfire in France and from the identity of the author's organism with a culture of *Bact. tabacum* obtained from that country, the author concludes that the disease present in Belgium is definitely wildfire.

A list is given of the reaction to inoculation of 17 varieties of tobacco and another of the numerous species of plants which were successfully inoculated with the Belgian tobacco organism. *Atropa belladonna* was observed naturally infected.

Armstrong (G. M.) & Albert (W. B.). **Downy mildew of Tobacco on Pepper, Tomato, and Eggplant.**—*Phytopath.*, xxiii, 10, pp. 837–839, 1933.

Attention is drawn to the occurrence in 1933 of downy mildew of tobacco (*Peronospora hyoscyami*) on tomato, pepper [*Capsicum annuum*: *R.A.M.*, xii, p. 732], and eggplant in South Carolina. The measurements [which are tabulated] of 600 spores each from tobacco and the other hosts left no doubt as to the identity of the causal organism. The disease has only appeared on these three hosts since the outbreak of tobacco downy mildew in the areas concerned and its artificial transmission from tobacco to pepper was effected under controlled conditions.

Shear (G. M.). **Field and laboratory studies on frenching of Tobacco.**—*Virginia Agric. Exper. Stat. Tech. Bull.* 49, 14 pp., 4 figs., 1 chart, 1933.

When ammonium sulphate, superphosphate, potassium sulphate, sodium chloride, and stable manure, respectively, were applied to plots of Burley tobacco on a clay loam soil in Virginia, frenching [*R.A.M.*, xii, p. 205] developed in a well-defined area unrelated to the treatments but on which the appearance of the disease in successive years had coincided with periods of heavy rain. The stable manure and ammonium sulphate plots showed a smaller percentage of affected plants than the adjacent untreated plots, but the potas-

sium sulphate and superphosphate appeared to make no difference in this respect.

In the greenhouse, frenched plants growing in pots containing the same clay loam from an area producing frenching recovered after applications of sodium nitrate or ammonium sulphate, as well as after improved soil aeration. The addition of absorbent cotton to the soil (to reduce the available nitrates through the competing requirements of the cellulose-decomposing micro-organisms) aggravated the disorder, the plants showing signs of nitrogen deficiency. The condition could not be corrected by spraying the foliage of affected plants with sodium nitrate or by supplying the nitrate to roots growing beneath the pots, though when nitrate was applied to the soil in the pots at the same rate recovery took place.

Frenching could not be induced in water cultures as a result of nitrate deficiency, inadequate aeration, or both combined.

The partial sterilization of soil that normally produced frenching prevented the condition when the treatment was strong enough to kill weed seed in the soil.

Frenching appeared in soils the P_H value of which ranged from 5·8 to 7·9, the rate of development being greatest between P_H7 and 7·55, decreasing quickly above this range, and falling more gradually as acidity increased.

That the condition occurred in sand cultures watered with the solution leached from soil that produced it is held to indicate that frenching is a toxicity, and not a deficiency, disease [ibid., xi, p. 807].

AINSWORTH (G. C.). **An investigation of Tomato virus diseases of the mosaic 'stripe', streak group.**—*Ann. of Appl. Biol.*, xx, 3, pp. 421–428, 2 pl., 1933.

Further investigations by the author into virus diseases of the tomato [*R.A.M.*, xii, p. 730] showed that ordinary or mild tomato mosaic and authentic tobacco mosaic (Johnson's No. 1) each produced mottling with malformation and stunting on tomato, tobacco, *Nicotiana macrophylla*, eggplant, *Solanum ciliatum*, *Physalis pubescens*, *Capsicum annuum*, and *Petunia*, but did not infect cucumber. On tobacco no necrotic local lesions were produced, infection always being systemic; slight clearing of the veins was succeeded by a dark green mottle and by a degree of stunting and leaf distortion that depended on the season. On *N. glutinosa* necrotic local lesions developed, but infection never became systemic and the virus could not be reisolated. On *Datura stramonium* numerous necrotic local lesions were produced; infection was never systemic but sometimes dark brown lesions developed on the petiole and the part of the stem below the node of an inoculated leaf.

On *N. glutinosa*, *D. stramonium*, *S. ciliatum*, *P. pubescens*, and *C. annuum* the symptoms of glasshouse streak [ibid., ix. p. 747; xii, p. 731] were identical with those of tobacco mosaic. On tomato, glasshouse streak symptoms agreed with those of stripe (attributed to *Bacillus lathyri*), but in addition a mottle identical with that due to tomato mosaic sometimes developed, and was often the only symptom, agreeing with one form of tomato mosaic

described by Gardner and Kendrick [ibid., i, p. 401]. On tobacco necrotic lesions, eventually reaching up to 6 mm. in diameter, developed two to four days after inoculation, adjacent lesions sometimes coalescing into large necrotic areas: this was occasionally the only symptom. Sometimes, primary systemic infection followed at once, a necrosis spreading rapidly down the petioles of the inoculated leaves into the younger ones. The plant was often killed, but if it survived growth was very slow and the leaves were mottled and developed necrotic lesions between the veins. Plants showing only local lesions grew normally, and no virus could be isolated from the upper parts. Later, some of these plants showed an internal stem necrosis which rapidly spread upwards, causing a vein necrosis of the apical leaves (secondary systemic necrosis); the virus could then be isolated unchanged. Growth became arrested, and if resumed was generally due to the development of an axillary bud near the base. On eggplant, tomato mosaic produced no local lesions, and the systemic symptoms were a very slight mottle and stunting whereas glasshouse streak caused chlorotic areas or necrotic lesions on the inoculated leaves together with a severe necrosis of the veins, causing the leaves to dry up and fall; some necrosis of the stem and petioles was also present.

One strain of tomato mosaic was observed for eighteen months and others for shorter periods but no variant arose, the symptom picture remaining remarkably constant. No strain of glasshouse streak reverted to tomato mosaic. Tomato mosaic did not produce tomato stripe; glasshouse streak inoculations gave a mixture of mottled and striped plants, and further inoculations from these gave both mottled and striped plants, irrespective of the parent type: the virus always retained its identity on different hosts and under different treatments. When tobacco plants were inoculated with a mixture of tomato mosaic and glasshouse streak, the tomato mosaic was recovered in a pure state from the plants in which the glasshouse streak component produced only local lesions. In a commercial tomato crop there is often a mixed infection with these two viruses, but tobacco can be used for filtering out the glasshouse streak component.

The symptoms of mixed virus streak [ibid., xii, p. 731] are identical with those of glasshouse streak, but the former differs from the latter in that it nearly always gives 100 per cent. of streak plants on inoculation, while glasshouse streak is more capricious. There are also differences in incubation period, longevity of the virus, and the like. In young plants this streak rarely gives only a mottle, and when it does, plants inoculated from such a plant show tomato mosaic symptoms only.

On tomato the symptoms of mixed virus streak are the same whether the potato mosaic component is combined with tomato mosaic or glasshouse streak, but on tobacco, while local lesions are produced by both mixtures, the tomato mosaic mixture produces severe necrosis of the leaves above those inoculated, whereas the glasshouse streak mixture produces severe leaf necrosis only in certain plants, others showing only systemic symptoms due to the potato mosaic component, in which case tobacco can be used to separate the potato mosaic.

RAINIO (A. J.). **Untersuchungen über ein Fäulnisbakterium der Tomatenfrüchte (Bacillus aroideae Townsend).** [Studies on a rotting bacterium of Tomato fruits (*Bacillus aroideae* Townsend).]—*Valtion Maatalouskoetoiminnan Julkaisuja* 45, 29 pp., 9 figs., 1932. [Finnish summary. Received January, 1934.]

In 1930 the writer observed that greenhouse tomatoes in a commercial nursery, besides showing infection by *Cladosporium fulvum* and *Phytobacter lycopersicum* [*R.A.M.*, x, p. 494], both common in Finland, were attacked by *Bacillus aroideae* [ibid., xii, pp. 121, 332, 421], causing a yellowish-brown, malodorous rot of the still green fruit. The morphological, cultural, and biochemical characters of the organism are fully described. The results of inoculation experiments on the Erste Ernte [First Harvest] and Alice Roosevelt varieties denoted that the bacterium is a wound parasite which thrives only at a temperature approaching its optimum of 35° C., so that serious damage to outdoor tomatoes is unlikely in Finland, where the mean open air temperature from 28th July to 10th August, 1930, was only 15° to 18°. Positive results were obtained in inoculation tests on the seed capsules of a number of other greenhouse plants, including *Papaver orientale*, *Iris germanica*, *Hemerocallis hybrida*, *Trillium grandiflorum*, *Fritillaria meleagris*, and *Allium bulbiferum*. Good control of the tomato rot was secured on a small scale by the application of 2 per cent. Bordeaux mixture, but it is not expected that such treatment will be generally necessary under Finnish conditions.

WAGER (V. A.). **A stem rot of transplanted Tomatoes due to Pythium aphanidermatum (Eds.) Fitz.**—*S. African Journ. of Sci.*, xxx, pp. 247–249, 1933.

In May, 1932, and January, 1933, tomato seedlings at the Sub-Tropical Research Station, Nelspruit, were attacked a week after transplanting by *Pythium aphanidermatum* [*R.A.M.*, xi, p. 330], causing a soft rot of the stem 2 to 3 in. above soil level, followed by the collapse and death of some 20 per cent. of the plants. Inoculation experiments through the soil were successful only during the summer, indicating that high temperatures are necessary for the pathogenic activity of the fungus. The disease was further observed to be more virulent among deep-planted seedlings than in shallow plantings. *P. aphanidermatum* is stated to be widely distributed in the Transvaal and Cape Colony on tobacco, in the former province also on tomato, on eggplant and *Sechium edule* at Nelspruit, on tomato and squash [*Cucurbita* sp.] at Windhoek, South-West Africa, and on bracken (*Pteridium aquilinum*) at White River, Transvaal.

WAGER (V. A.). **Fusarium wilt in Tomatoes in South Africa.**—*S. African Journ. of Sci.*, xxx, pp. 240–246, 1933.

Serious losses are stated to be caused annually in the tomato crops of the Eastern Transvaal lowveld by *Fusarium bulbigenum* f. 1 Wr. (*F. lycopersici*) [*R.A.M.*, xii, p. 732 ; xiii, p. 101], which causes a yellow to brown discoloration, wilting, and ultimate death of the leaves. Inoculation experiments showed great differences

in virulence between the various strains of the organism, which has also been found on papaw infected by foot rot and on a wilted carnation. Of the numerous species of *Fusarium* from a wide host range used in inoculation experiments, only *F. bulbigenum* f. 1 was capable of inducing wilt in tomatoes. The fungus was detected on four seeds from 16 samples of tomato seed obtained from different merchants, indicating the possibility of introducing the disease into new localities on the seed. The optimum temperature for the growth of *F. bulbigenum* f. 1 was found to be about 80° F., a fact that explains the greater virulence of wilt in the hot weather. All the seven wilt-resistant American varieties, viz., Columbia, Norton, Norduke, Marvana, Marvelosa, Marglobe, and Marvel, grown in the infected area during 1927–8 showed a very satisfactory performance compared with the commonly grown Beauty, and attempts are in progress at the Sub-Tropical Research Station, Nelspruit, to produce from the best of these a highly resistant variety adapted to local conditions.

KREUTZER (W. A.) & DURRELL (L. W.). **Collar rot of Tomatoes.**—*Colorado Agric. Exper. Stat. Bull.* 402, 12 pp., 5 figs., 1 graph, 1933.

Collar rot of tomatoes (*Macrosporium* [*Alternaria*] *solani*) [*R.A.M.*, xi, p. 355 and above, p. 151] was observed in the Arkansas and Grand Valleys of Colorado in 1931, causing a loss of 20 per cent. of some crops. The symptoms of the disease are briefly described, with observations on the environmental conditions favouring the development of the fungus. The presence of *A. solani* in the seed-bed soil was found to reduce germination by an average of 46 per cent. Field experiments showed that infection does not spread from plant to plant, since the organism migrates too slowly through the soil to reach the host before it attains maturity and resistance. Deep transplanting is commonly followed by root formation above the site of attack and is suggested as a means of control. Soil sterilization by steam or with 1 in 50 formaldehyde is also recommended.

PEARSON (R. S.). **Report of the Director of Forest Products Research for the year 1932.**—*Rept. Forest Products Res. Board for the year 1932*, pp. 3–51, 9 pl., 1 fig., 2 graphs, 1933.

Tests are in progress at the Forest Products Research Laboratory, Princes Risborough, to ascertain the effect of stain-producing fungi on the strength of the wood, *Ceratostomella coerulea* and *C. cana* being selected as the fungi and the sapwood of Scots pine [*Pinus sylvestris*] as the timber. The progress of the infection was found to be extremely slow.

In the test plots of wood preservatives [*R.A.M.*, x, p. 142] many of the specimens originally laid down have developed considerable decay; all the creosoted stakes are sound but some of those treated with water-soluble preservatives are affected, though much less so than the untreated controls, most of which are now decaying. That the failure of the water-soluble preservatives was due to the preservative becoming leached out of the timber was confirmed by the perfect soundness of specimens kept without exposure to leaching.

Progress was made in estimating the resistance of home-grown and Empire timbers to the attacks of fungi growing under controlled conditions, the method used being similar to that employed in wood-block tests of antiseptics [ibid., xi, p. 487]; after four months the blocks of Western red cedar (*Thuja plicata*) were still free from any fungal growth.

The collection of wood-destroying fungi maintained in pure culture [ibid., xii, p. 342] has been expanded and some tropical forms included; cultures of fungi attacking timber in Australia were received through the co-operation of the Australian Division of Forest Products.

A detailed study was begun of the rots attacking English oak [*Quercus robur*] and descriptions are being prepared of those affecting both standing trees and felled timber.

In a room in the experimentally constructed house [ibid., xi, p. 487] *M. lacrymans* had covered the greater part of a hollow floor with no ventilation beneath, in 18 months after inoculation. The moisture content of the test samples placed in contact with the joists ranged from 25 to 40 per cent. of the dry weight, a moisture content of over 27 per cent. being found only in samples attacked by the fungus. In the same room alternate boards were removed from a part of the floor where *M. lacrymans* was in active growth and were replaced by boards of *T. plicata* and *Tsuga heterophylla*; after nine months the latter was slightly attacked but the former unaffected. In a 'well-constructed' room with adequate ventilation under the floor no fungal growth took place, though each section of the floor was twice infected with wood on which *M. lacrymans* was in active growth.

Evidence was obtained that in the advanced stages of its attack on wood *Armillaria mellea* is capable of attacking lignin [ibid., xii, p. 343]. Ten distinct forms of white rot were studied chemically and the results obtained tended to support the view that all fungi of this type decompose carbohydrates as well as lignin; no uniformity, however, prevails as regards the order or proportion in which the different components of wood are decomposed.

STEVENS (N. E.). **United States: the Dutch Elm disease discovered in New Jersey.**—*Internat. Bull. of Plant Protect.*, vii, 10, pp. 229–230, 1933.

Further notes are given on the distribution of the Dutch elm disease (*Graphium* [*Ceratostomella*] *ulmi*) in the United States. Up to 27th July, 1933, 69 infected trees, from which the fungus was isolated and determined in culture, were found in 14 towns and cities in three counties of New Jersey [*R.A.M.*, xiii, p. 64], all within 20 miles of New York City. As soon as definite determinations are made the diseased trees are removed and burnt. A single new case was discovered early in 1933 in Cleveland, where the first cases were found in 1930 [ibid., ix, p. 749].

WOODWARD (C. H.). **Surveying for Dutch Elm-disease.**—*Journ. New York Bot. Gard.*, xxxiv, 406, pp. 222–224, 1933.

In September, 1933, a survey of Westchester County, New York,

for the Dutch elm disease (*Graphium* [*Ceratostomella*] *ulmi*) [see preceding abstract] was initiated by P. V. Mook and assistants, who discovered two cases. Similar work is in progress in Massachusetts and Connecticut. According to R. K. Beattie, ten other infected trees have recently been found in New York State, the fungus being isolated from the affected material in every case. In New Jersey the number of authenticated cases of *C. ulmi* infection is stated to have increased from 69 to 309 since 31st July, 1933.

RIVERA (V.). **Prospettive di lotta contro il marciume radicale del Gelso.** [Prospects of the control of Mulberry root rot.]—*Atti Pont. Accad. Sci. Nuovi Lincei*, lxxxv, pp. 112–120, 3 figs., 1932. [Received December, 1933.]

To ascertain whether falchetto diseases of mulberries [*R.A.M.*, ix, p. 7] might be treated by a hot water treatment of the seedlings without injury to the latter, the author inoculated six-day old mulberry seedlings with *Armillaria mellea* and exposed them in specially constructed thermostats for 48 hours to soil temperatures ranging from 20° to 58° C., some of the plants also being kept at −2° for 24 hours.

Although the effects of the inoculations were inconclusive, definite evidence was obtained of the marked resistance of the seedlings to heat, exposure even to 58° only temporarily arresting growth.

The application of boiling water (1 l. per 0·055 c.m. of soil) to the foot of young mulberry plants in full vegetation resulted in their death after one month.

JØRGENSEN (C. A.) & FERDINANDSEN (C.). **Destruktionsfaenomener i Bøgetræ, foraarsaget af Hypoxylon coccineum Bull.** [Destruction phenomena in Beech wood caused by *Hypoxylon coccineum* Bull.]—*Dansk Skovforen. Tidsskr.*, *1933*, 9, pp. 389–402, 5 figs., 1933.

Beech logs in Danish forests have recently been damaged by a white rot of the inner portions of the wood, which was found by isolations from the diseased tissues to be caused by *Hypoxylon coccineum*. The fungus has never been found by the authors on a living substratum, and infection presumably takes place on the felled material by means of the oval, hyaline conidia (3·5 to 4 by 2·5 to 3 μ), arising on erect, branched conidiophores from a greenish to greyish-brown stroma, and constituting the conidial stage, *Trichosporium tulasnei*, of *H. coccineum*. The mycelium is able to persist for months in the interior of the wood, the decay of which does not reach an advanced stage until the late summer. The brownish-red to black stromata of the perfect stage are formed in or on the bark or on the naked wood. During the winter of 1932–3 beech railway sleepers in various places were found to be damaged by *H. coccineum*, accompanied to a slight extent by *Stereum purpureum*. On the bark of felled beech logs in the forest *Quaternaria persoonii* was present in abundance but apparently played no part in the rotting. A characteristic feature of the latter is the streaky effect produced by the intervening strips

or 'islands' of healthy tissue; black lines frequently mark the separation of the infected from the sound wood.

Insect transmission of spike disease.—*Nature*, cxxxii, 3337, pp. 592–593, 1933.

It is stated that in a forthcoming paper by M. Appanna and C. Dover details will be reported of the successful transmission of what appears to be true spike disease of sandal [*Santalum album*: see next abstract] in three cases by means of the Jassid *Moonia albimaculata*. Proof of the identity of the disease by grafting from the artificially infected trees has still to be given.

Rao (Y. V. S.). **Contributions to the study of the spike-disease of Sandal (Santalum album, Linn.). Part XIII. Investigation of the hexone bases. Part XIV. Study of mosaics associated with spiked areas.**—*Journ. Indian Inst. Sci.*, xvi A, 8, pp. 91–95, 1933.

It has already been shown [*R.A.M.*, ix, p. 213] that the onset of spike disease of sandal (*Santalum album*) [ibid., xii, p. 479] is accompanied by a distinct increase in the basic nitrogen content of the leaves. The basic fraction has now been partitioned into individual aminoacid components by Van Slyke's method, the material used consisting of two healthy and two spiked samples from two areas near Bangalore, South India. The total amounts of nitrogen in the diseased samples from the two areas were 2·21 and 1·43 per cent., respectively, compared with 1·77 and 1·94 per cent. in the healthy ones; water-soluble nitrogen 0·78 and 0·39 per cent. in the spiked and 0·56 and 0·37 per cent. in the healthy samples; basic fraction 0·19 and 0·12 per cent. (diseased) and 0·09 and 0·08 per cent. (healthy). The spiked samples contained large quantities of histidine (42·1 and 16·7 per cent. compared with 3·3 and 0·4 per cent.), the conversion of which into histamine is believed to explain the necrosis of the spiked root ends.

In a number of areas in South India characterized by the prevalence of spike disease in the sandal trees, mosaic symptoms were observed in some of the local weeds, such as *Gisekia* and *Ageratum* spp. Since it was absent from districts free from spike, biochemical investigation of the *Ageratum* mosaic was undertaken in two areas with a view to tracing a possible correlation between the two conditions. Mosaic-diseased *Ageratum* leaves were found to contain almost as much calcium as normal ones, whereas in spiked sandal foliage the calcium content is low. On the other hand, diseased *Ageratum* leaves contained less phosphoric acid (0·43 and 0·89 per cent.) than healthy ones (0·78 and 1·88 per cent.). There was a striking increase in the ammoniacal nitrogen content of mosaic *Ageratum* foliage (3·4 and 2·8 per cent. free ammonia compared with 1·2 and 0·9 per cent. in healthy samples), indicating a similarity to tobacco mosaic and spinach blight [ibid., xii, p. 673] rather than to sandal spike, in which the ammoniacal nitrogen content is not appreciably modified. Conversely, diseased *Ageratum* does not show the high basic nitrogen content typical of spiked sandal.

Ross (H.). **Über nicht parasitäre Hexenbesen an Robinia pseudacacia.** [On non-parasitic witches' brooms on *Robinia pseudacacia*.]—*Ber. Deutsch. Bot. Gesellsch.*, li, 7, pp. 292–300, 6 figs., 1933.

A 70- to 80-year old *Robinia pseud-acacia* tree on an estate visited by the writer near Frankfurt a. Oder bore towards the tips of the lowest lateral branches witches' brooms 1·5 to 2 m. in diameter [cf. *R.A.M.*, xii, p. 405]. No flowers were produced by the brooms, thorns were rudimentary or absent, and the late developing leaves were somewhat larger than the normal. Instead of one axillary bud there were several, arranged in decreasing order of size, between the leaf axil and the main axis, and the witches' brooms arise through the simultaneous development of these axillary buds which would normally have remained dormant. The structure of the 'brooms' formed in this manner was quite irregular. Near the peripheral portions of the brooms were numerous rod-shaped, unbranched, fairly long, upward-tending shoots similar to the water-shoots at the base or in the crown of old trees.

The shoot axes of the witches' brooms were generally more vigorous than those of the normal parts of the tree, the average basal diameter at one year old being 4 to 6 mm.; the internodes were shorter and their angles less acute. On an average the pith occupied $\frac{5}{10}$ to $\frac{6}{10}$ of the shoot axis of a broom, and the xylem and cortex $\frac{1}{10}$ to $\frac{2}{10}$, the corresponding figures for a normal axis being $\frac{3}{10}$ to $\frac{4}{10}$ and $\frac{6}{10}$, respectively. The xylem of the broom axes also contained more and larger vessels and more tyloses.

All attempts to propagate the witches' brooms by grafting gave negative results. No evidence of parasitic infection was forthcoming [ibid., vi, p. 706], and the trees had not been exposed to injury by animals. The possibility of bud mutation, due to specially copious nutrition, is discussed.

Hahn (G. G.). **An undescribed Phomopsis from Douglas Fir on the Pacific Coast.**—*Mycologia*, xxv, 5, pp. 369–375, 1 pl., 1933.

The green form [var. *viridis*] of the Douglas fir (*Pseudotsuga taxifolia*) at Lokoya, Napa County, California, was observed in 1930 to bear conspicuous cankers caused by a species of *Phomopsis*, which was shown by comparative systematic studies to be morphologically and culturally distinct from the four related conifer parasites, *P. juniperovora*, *P. occulta*, *P. pseudotsugae*, and *P. strobi* [*R.A.M.*, x, p. 278] and is accordingly named *P. lokoyae* n. sp. [with English and Latin diagnoses]. It is characterized by erumpent, conical, lenticular, or subglobose, truncate pycnidia, averaging 300 to 565 μ broad and 175 to 300 μ in height; pycnospores emerging in a whitish tendril or mass from a single locule lined with a hymenial layer of slender, flexuous, subulate, subacutely pointed sporophores 5 to 20 μ long, from the tips of which are abstricted unicellular, hyaline A- and B-spores, the former elliptic-fusoid, oblong-elliptic, or oblong with obtuse or subacute extremities, commonly biguttulate, 4·8 to 10 by 1·6 to 4 μ (200 spores), mostly 6 to 10 by 2 to 4 μ; and the latter of the

scolecosporic type, with obtuse or subacute extremities, 9 to 14·2 by 1·4 to 3·2 μ (mostly 10 to 12 by 1·5 to 2·5 μ). The perfect stage is unknown.

BOYCE (J. S.). **A canker of Douglas Fir associated with Phomopsis lokoyae.**—*Journ. of Forestry*, xxxi, 6, pp. 664–672, 1 fig., 1933.

A full account is given of the Douglas fir (*Pseudotsuga taxifolia*) canker caused by *Phomopsis lokoyae* n. sp. [see preceding abstract], which was found in 1930 scattered through the coast ranges of northern California and extending northwards into southern Oregon. The disease, which is stated exactly to resemble that caused by *P. pseudotsugae* in Great Britain, was confined to saplings (up to 20 years old) on poor sites, generally below 2,500 ft. above sea level, and occasioned only negligible damage. The local epidemic of 1929–30 is attributed to favourable weather conditions for the fungus. Incense cedars [*Libocedrus decurrens*], sugar pines [*Pinus lambertiana*], and *P. ponderosa* were also attacked in a few places.

On the trunk the elliptical cankers averaged 3 to 8 in. in length and 1 to 2 in. in width, with a maximum of 32 by 3 in., while those on the branches ranged from less than an inch to 1 ft. or more in length. The cortex and cambium were killed, but the sapwood was not directly injured. The end of a leader or of a lateral branch was sometimes killed back for two to three internodes, a sudden increase in thickness marking the passage from the diseased to the healthy portion of the stem. The short terminal or lateral shoots on the twigs were commonly destroyed. Pycnidia were formed in profusion in the spring and early summer on the dead bark of cankers and of killed-back leaders or branches, as well as on the bark of trees that had died from drought and other causes. The cankers are apparently annual, being formed during the dormant period of the host and generally persisting for one season only, though an occasional approach to the perennial habit was observed. As a rule the trunks bore only one or two cankers (six or eight being exceptionally found) and rapid healing usually took place. Infection leading to cankers seemed mostly to occur through dead branches or twigs, rarely through wounds. An examination of old cankers indicated that the disease was of long standing, dating back at least to 1914–15 and probably much earlier. In the writer's opinion the causal organism is indigenous to the region under observation, but the mild character of the disease and the improbability of further serious damage do not at present justify intensive studies.

MORSE (ELIZABETH E.). **Its ancient enemy discovered. The Incense Cedar reveals the secret of its destruction.**—*Amer. Forests*, xxxix, 11, pp. 502–503, 1933.

A popular account is given of the damage caused to the incense cedar [*Libocedrus decurrens*] along the Pacific coast by *Polyporus amarus* [*R.A.M.*, x, p. 571], the scarcity of information on which may be due to the infrequent development of the brown sporophores and their destruction by birds in the search for insect food.

The fungus works in both standing and felled trees and has been known to continue in the latter for 27 years. The rotted wood disintegrates into cubical blocks, the 'pockets' being sometimes so wide as to render it useless even for underpinning or fence posts. The incense cedar, despite the value of its wood, is officially rated as an 'inferior species' owing to the heavy losses caused by *P. amarus*, which could be largely avoided by precautions against wounding and fire.

HEDGCOCK (G. G.) & HUNT (N. R.). **Notes on some species of Coleosporium.—III.**—*Mycologia*, xxv, 5, pp. 392–396, 1933.

Continuing their series of critical and taxonomic notes on some species of *Coleosporium* [*R.A.M.*, ii, p. 348], the writers describe the results of successful inoculation experiments on *Veronia* spp. with *C. carneum*, on *Elephantopus* spp. with *C. elephantopodis*, and on *Laciniaria* spp. with *C. laciniariae*, all collected on *Pinus* spp. in the United States. *C. heterothecae* n. sp., occurring in profusion on *Heterotheca* (*Inula*) *subaxilluris* in Florida (which may have its aecidial stage on *P. palustris*, though this has not yet been established), is furnished with Latin and English diagnoses.

HIRATSUKA (N.). **Inoculation experiments with heteroecious species of the Japanese rust fungi.**—*Bot. Mag.*, Tokyo, xlvii, 562, pp. 710–714, 1933.

Notes are given on the writer's inoculation experiments with eight heteroecious Japanese rusts [cf. *R.A.M.*, xii, p. 726], amongst which the following may be mentioned. Needles of *Abies mayriana*, *Larix kaempferi*, and *Picea jezoensis* were inoculated with the germinating teleutospores of *Pucciniastrum kusanoi* from fallen leaves of *Clethra barbinervis*. Spermogonia developed only on the first-named conifer ten days after inoculation, followed in another nine days by peridermia. *C. barbinervis* was successfully inoculated in turn with aecidiospores from *A. mayriana*, uredosori appearing in ten days. The amphigenous, subcuticular, lenticular to flattened-hemispherical, honey-yellow spermogonia on *A. mayriana* measure 90 to 150 μ across and 45 to 60 μ in height; the oblong, smooth, hyaline spermatia are 3·5 to 5·5 by 1·2 to 2 μ; the hypophyllous, biseriate, cylindrical aecidia measure 0·5 to 2 mm. in length by 0·24 to 0·32 mm. across; the rhomboidal or hexagonal, overlapping peridial cells have smooth and thin outer, and verrucose, thicker inner walls, and measure 50 to 69 by 12 to 18 μ; the globose, subglobose, or ellipsoidal aecidiospores measure 18 to 25 by 13·5 to 18 μ, and have a hyaline, densely verrucose epispore.

FISCHER (E.). **Die Rostepidemie der Rottanne in den Alpen in Herbst 1932.** [The rust epidemic on Spruce in the Alps in the autumn of 1932.]—*Mitt. Naturforsch. Gesellsch. Bern, 1932*, pp. xx–xxi, 1933.

A brief abstract is given of a lecture on the life-history of *Chrysomyxa rhododendri* [*R.A.M.*, xii, p. 67] and of the conditions governing the epidemic occurrence of the rust on spruce [*Picea*

excelsa] in the Swiss Alps. Intensely severe outbreaks, such as that of 1932, are due to the exact coincidence between the development of the basidiospores on the Alpine rose [*Rhododendron ferrugineum* and *R. hirsutum*] and the period of greatest susceptibility on the part of the needles. The damage caused by the rust is not very heavy, no appreciable thinning of the affected stands having occurred during the centuries since the disease was first recognized, though the present gradual decline in the density of the forests may be partially attributable to this cause.

Liese (J.). **Vererbung der Hexenbesenbildung bei der Kiefer.** [The inheritance of the witches' broom habit of growth in the Pine.]—*Zeitschr. für Forst- u. Jagdwesen*, lxv, 10, pp. 541–544, 3 figs., 1933.

The heritability of the witches' broom habit of growth has been convincingly demonstrated in the spruce by Tubeuf [*R.A.M.*, xii, p. 664], and the writer here briefly describes his experiments in confirmation of this as regards pines with plants raised from pine cones from witches' brooms. Of the eight seedlings successfully reared, three were normal while the remainder showed the typical witches' broom development accompanied by marked stunting of the root system. The transmissibility of the witches' broom tendency from the parent tree to its progeny would thus appear to hold good for the pine as well as the spruce.

Boas (I. H.). **The prevention of decay in building foundations.**—*Commonwealth of Australia, Council Sci. & Indus. Res., Div. Forest Prod. Trade Circ.* 18, 15 pp., 2 figs., 1933.

Directions are given in popular terms for the avoidance of decay due to dry rot in Australian structural timbers. Various fungi [unspecified] are concerned in the rotting of the wood, and general instructions are given for their control by sanitary precautions and treatment with hot creosote oil (200° F.) containing a minimum of 5 per cent. tar acids [a tentative specification for which is appended], 5 per cent. zinc chloride, or 3 per cent. sodium fluoride, the first for preference.

MacLean (J. D.). **Experiments with the Boulton process in the treatment of green Southern Pine poles.**—*Proc. Amer. Wood Preservers' Assoc.*, xxix, pp. 343–359, 2 figs., 1 diag., 1933.

The results [which are fully discussed and tabulated] of experiments at the Forest Products Laboratory, Madison, Wisconsin, on the treatment of loblolly [*Pinus taeda*] and longleaf [*P. palustris*] pine poles from South Carolina showed that the Boulton process [*R.A.M.*, xi, p. 815] of boiling under vacuum at 200° F. prior to impregnation with coal-tar creosote was much more effective than the steaming and vacuum method in reducing the moisture content of the poles and did not necessitate subjecting the wood to such high temperatures. The most satisfactory results were obtained when preservative temperatures of about 200° F. were used. Where heavy absorptions (over 10 lb. per cu. ft.) of preservative are required, e.g., in marine piling, the Boulton process is likely to prove

more satisfactory than the steaming process, but if it is desired to limit the retention of the preservative to less than 10 lb. per cu. ft. the latter may be preferable. Considerable difficulty was experienced in obtaining the complete penetration of sapwood, irrespective of the process used, when the net retention was limited to 10 lb. or less per cu. ft. and the timbers had an average thickness of sapwood.

RHODES (F. H.) & ERICKSON (I.). **Effect of tar acids upon the wetting of wood by coal-tar oils.**—*Indus. & Engin. Chem.*, xxv, 10, pp. 1132–1133, 1 graph, 1933.

Details are given of an experiment showing that phenols serve a useful purpose in creosote oil by facilitating the wetting of the wood (Norway spruce) [*Picea excelsa*] and increasing the stability of oil adsorption by the fibres, even though they add little to the actual fungicidal value of the oil [cf. *R.A.M.*, xiii, p. 137]. The wetting power, as indicated by the heat of wetting, is increased about 70 per cent. by the admixture of 5 per cent. phenol with the neutral oil.

KRIEG (W.) & PFLUG (H.). **Über einige Methoden zur Prüfung von Holzkonservierungsmitteln. I & II.** [On some methods for the testing of timber preservatives. I & II.]—*Chem. Zeit.*, lvii, 78, pp. 773–774; 80, pp. 794–795, 1 fig., 1933.

Technical details are given of various methods used by the writers to test the resistance of timber preservatives to leaching out.

NIELSEN (N. J.). **Forsøg med Bekaempelse af Kaalbroksvamp.** [Experiments in the control of the club root fungus.]—*Tidsskr. for Planteavl*, xxxix, 3, pp. 361–391, 1 fig., 3 graphs, 1933. [English summary.]

The results [which are fully discussed and tabulated] of ten years' experiments in the control of club root of swedes (*Plasmodiophora brassicae*) in Denmark [*R.A.M.*, xiii, p. 142] showed that two factors are of primary importance in combating the disease, namely, the maintenance of an appropriate soil reaction by applications of lime up to 18,000 kg. per hect. and a six- to eight-year system of cruciferous crop rotation. The lime appeared to be equally serviceable whether burnt lime or carbonate was used. The attack was not abated when susceptible crops (e.g., swedes) were grown as far apart as every fourth year. Some indication was obtained of the possible maintenance of infection by the agency of cruciferous weeds [ibid., xiii, p. 2].

KÜTHE (K.). **Kranke Kohlpflanzen.** [Diseased Cabbage plants.]—*Natur und Museum*, lxiii, 10, pp. 357–358, 2 figs., 1933.

A brief note is given on the occurrence of *Phoma lingam* [*R.A.M.*, xiii, p. 71] on cabbage in the Giessen district of Germany, and on the necessity of investigating various important points in connexion with the disease, e.g., the mode of transmission and varietal reaction.

NIELSEN (O.). **Forsøg med Bekaempelse af Skulpesvamp.** [Experiments in the control of the siliqua fungus.]—*Tidsskr. for Planteavl*, xxxix, 3, pp. 437–452, 3 figs., 1933. [English summary.]

Seed production in crucifers, especially white cabbage and cauliflower, is stated to be greatly reduced in Denmark by the attacks of *Alternaria brassicae* and *A. circinans* [*R.A.M.*, xiii, p. 3], which invade the siliquae and penetrate the seed besides damaging the assimilatory tissue of the leaves and stems. Infected siliquae may rupture prematurely, so that a quantity of seed is lost. The attack generally takes place shortly before harvest and spreads rapidly until the seed is removed and ripened by drying.

In a series of experiments with two to seven applications of 2 per cent. Bordeaux mixture plus 0·5 per cent. lead or calcium arsenate, the percentage of seed infection by the fungi, as judged by counts after three days in the germinator, was reduced by half and the germination increased by 9 per cent. A motor sprayer with a pressure of 10 to 20 atmospheres should be used, the addition of spreaders then being superfluous. A Bordeaux dust known as 'himmo' failed to give adequate control. Some of the seed was also treated with a mercury compound, sanagran VIII [ibid., xi, p. 162], diluted with double its weight of inert material, 1 kg. of seed being dusted with 5 gm. of the mixture. The germination of the seed was not impaired by this treatment even after a year's storage, and the percentage of *Alternaria* infection was reduced. Care should be taken not to exceed the prescribed amount of sanagran, even 7·5 gm. of which per kg. is liable to cause injury.

Good results were also obtained by stripping the leaves off the overwintered plants in the spring and removing dead material.

BLATTNÝ (C.). **Kalimangelerscheinungen bei Blumenkohl.** [Potash deficiency symptoms in Cauliflower.]—*Ernähr. der Pflanze*, xxix, 19, pp. 361–362, 1 fig., 1933. [English summary.]

In July, 1932, cauliflower plants in black clay soil, rich in humus, in western Czecho-Slovakia, showed leaf curl, interveinal chlorosis, and discoloration of the inflorescences, which were so loosely arranged that the leaves grew through them. Almost 50 per cent. of the affected stands were unmarketable. The plots had been given potash in a readily soluble form, and a deficiency of this element following excessively heavy rains and cloudbursts early in July was, therefore, suspected. This was proved to be the case by the application of potash salts (1 doppelzentner per hect.) to some cauliflower plots in which the young plants showed incipient symptoms of the condition described above, complete recovery being effected in ten days. Other kinds of cabbage showed similar manifestations of potash shortage.

DE BRUYN (HELENA L. G.). **Kwade harten van de Erwten.** [Rotten hearts of Peas.]—*Tijdschr. over Plantenziekten*, xxxix, 11, pp. 281–318, 1 pl., 1933. [English summary.]

A comprehensive, tabulated account is given of the writer's studies in Holland on the 'rotten heart' disease of peas, which has

also been reported from certain low-lying south-eastern districts of England under the name of 'marsh spot', and from Northern France as 'moucheté'. Information supplied by the Dutch Seed Testing Station indicates that the disturbance was extremely severe in 1923 and 1926 and fairly so in 1932.

No external symptoms are apparent in the affected peas. Internally, the flat inner surface of one or both cotyledons while still enclosed in the seed coats shows a brown lesion of varying extent, sometimes accompanied by partial or entire necrosis of the plumule, which may retard or prevent germination. Observations made in 1930 showed that the percentage of rotten hearts increased during the latter part of July, when the seed was approaching maturity, the number affected on the 30th being 6·94 compared with 2·03 per cent. on the 18th. The disease does not affect all the pods on a plant or all the peas in a pod; the heaviest peas were found to be the most severely damaged. Microscopic examination revealed the presence of a yellowish-brown substance in and between the necrotic cells. Neither fungi nor bacteria could be isolated from the majority of the lesions, and the writer therefore concludes that the disorder is of physiological origin. Support was lent to this view by the results of five years' manurial experiments on heavy clay soil, which showed the beneficial effects of potash (1,000 kg. per hect.) in accelerating maturity and thus indirectly reducing the damage from marsh spot. That the condition, however, is not solely due to potash deficiency is apparent from its severity on the plots receiving a complete fertilizer and on those given potash plus nitrogen, these two treatments evidently tending to delay ripening. Weather conditions no doubt also play an important part, but further investigations are required to determine its significance.

WINGARD (S. A.). **The development of rust-resistant Beans by hybridization.**—*Virginia Agric. Exper. Stat. Tech. Bull.* 51, 40 pp., 18 figs., 1933.

A fully detailed, tabulated account is given of the writer's experiments in Virginia in the development of rust- (*Uromyces appendiculatus*) resistant strains of susceptible dwarf and pole bean (*Phaseolus vulgaris*) varieties [*R.A.M.*, xii, p. 415], such as Kentucky wonder (a pole variety) and Navy (a dwarf type), by crossing these with resistant forms. Navy was crossed with Improved Godiland (also dwarf), Kentucky Wonder with Brockton Pole and Horticultural, and Powell Prolific (another susceptible variety) with Marblehead (all pole varieties). The F_1 plants of all these crosses and their reciprocals were rust-resistant, showing that resistance is dominant. In the F_2 generation segregation occurred in the closely approximate ratio of three resistant plants to one susceptible, thus showing a single factor difference for rust resistance. With a view to isolating the most desirable strains from this generation of dwarf hybrids, the white seeds of various rust-resistant F_2 individuals were planted and the offspring inoculated with rust in the greenhouse. Generally speaking, the white seed (apparently correlated with rust resistance) was the only character to breed true for several generations, but after carrying the hybrids

through some 20 generations of selections covering a period of 15 years, the writer has isolated over 30 strains of rust-resistant beans of the Navy type which breed true for all their economic characters. Similar experiments with pole beans, covering a twelve-year period, have led to the development of some 20 hybrids of the Kentucky Wonder type which breed true for rust resistance and other desirable characters.

MAGEE (C. J.). **Etiology of the chocolate spot disease of Broad Beans.**—*New South Wales Dept. of Agric. Sci. Bull.* 43, 8 pp., 2 pl., 1933.

This description of the etiology of the dark red to reddish-brown spotting of the leaves of *Vicia faba* in New South Wales, found to be due to the deposition of honeydew by aphids (chiefly *Aphis rumicis* but also *Myzus persicae*), is an expanded version of a paper already noticed from another source [*R.A.M.*, xiii, p. 143].

Legislative and administrative measures.—*Internat. Bull. of Plant Protect.*, vii, 9, pp. 202–203, 204, 1933.

GERMANY (ANHALT). By Decree of 18th April, 1933, each actual or suspected fresh outbreak of potato wart (*Synchytrium endobioticum*) must be notified to the police within 24 hours. The debris of potato crops on infected fields must be collected and destroyed by burying or burning, and no potatoes dug on such fields may be replanted (resistant varieties may be replanted but only in the same or near-by sites). Potatoes from infected fields must not be removed from the place of cultivation and may be used only if boiled or baked. Only immune varieties are allowed to be grown in communes where wart disease is known to occur, and by 1937 the gradual substitution of resistant for susceptible varieties must be completed by agricultural and horticultural concerns throughout the country. Limited areas may be declared by local authorities to be 'zones in danger of contamination', to which the above-mentioned regulations may apply. [This Decree is also published in *Amtliche Pflanzenschutzbestimmungen*, v, p. 6, 1933.]

CAMEROON (FRENCH). By a Ministerial Decree of 4th April, 1933, any planter observing the presence of *Hemileia vestatrix* in his coffee plantations is required to notify the same to the administrative authority.

Amtliche Pflanzenschutzbestimmungen. [Official plant protection regulations.]—*Beil. Nachrichtenbl. Deutsch. Pflanzenschutzdienst*, v, 3, pp. 90, 91–97, 98–104, 1933.

DUTCH EAST INDIES. An order of the Governor-General of the Dutch East Indies, dated 14th October, 1932, published in the Staatsblad on 1st November and effective as from the following day, introduces the following modification in the Order of 27th September, 1926, regulating the importation of living plants [*R.A.M.*, vi, p. 768]. The importation of *Hevea* rubber seeds from South America is permitted only under special sanction of the Director of Agriculture, Industry, and Commerce, who will consider each case on its merits. As heretofore, the importation of

living rubber plants or parts thereof from South America is prohibited.

PHILIPPINE ISLANDS. To the list of plants prohibited from entry into the Philippine Islands under Legislative Act 3027 of 8th March, 1922 [ibid., iii, p. 749], are added, by Administrative Order of the Director of Plant Industry No. 11 of 21st May, 1932 (effective as from 1st August, 1932), the Chinese yellow and red kid citrus varieties, maguey (*Agave cantala*), and sisal (*A. sisalana*). As in the case of the plants subject to previously existing restrictions, however, small quantities of the above-mentioned may be imported under certain conditions which are specified in paragraphs 2 and 10 of an Administrative Order, No. 10, of 19th March, 1932, and must be kept under quarantine in isolation until they have been shown to be free from injurious insects and parasitic fungi.

POLAND. An Order of the Polish Minister of Finance of 22nd July, 1933, introduces certain further modifications in the Customs Order of 14th March, 1930, which has already undergone partial alteration by the Orders of 12th January and 22nd February, 1932, and 11th January, 1933. Potatoes of all kinds, including those intended for seed, may be imported only if accompanied by a properly authorized certificate vouching for the freedom of the consignments (with packing) from wart disease (*Synchytrium endobioticum*) [ibid., viii, p. 664] and powdery scab (*Spongospora subterranea*), and further that no centres of the former occur within a radius of 20 km. from the place of cultivation. Certificates of health in respect of crown gall (*Bacterium tumefaciens*), *Didymella applanata* (raspberry), *Sphaerotheca mors-uvae* (gooseberry), *Pseudoperonospora humuli* and virus diseases (hops), *Pseudomonas hyacinthi* (hyacinth) [ibid., xii, p. 514], and *Septoria azaleae* (azalea) [ibid., xii, p. 696] are further required. The absence of *Synchytrium endobioticum* from the packing materials and from the locality of cultivation must also be guaranteed in the case of bulbs, tubers, roots, and rooted plants. Should infection by any of the above-mentioned pathogens be detected in the imported consignments on official inspection, admission within the Polish fiscal area will be refused in respect of such material. Plant imports unaccompanied by official health certificates will not be released for commerce before they have been inspected by Polish plant protection experts and pronounced free from infection by dangerous diseases and pests.

Legislative and administrative measures. Spain.—*Internat. Bull. of Plant Protect.*, vii, 10, pp. 231–232, 1933.

By a Decree of 17th March, 1933, any Spanish forests showing signs of deterioration in consequence of insect and fungus injuries are to be regarded as contaminated by forest pests, all matters relating to the control of which will be directly in the charge of the General Administration of Forests, Fisheries, and Game. These authorities will regulate the importation, circulation, and sale of forest seeds, plants, and products from places harbouring such pests or diseases with a view to preventing the spread of the latter. Municipalities are required to notify the General Administration

of the occurrence of any pest or disease within the forest areas under their jurisdiction, while owners or holders of forest lands must notify the municipal authorities of the presence of such infestation on their properties. Protective and control measures in public forests will be carried out entirely at the expense of the State, whereas on corporation or private lands only the technical direction, apparatus, and the like will be the affair of the State, the owners being responsible for the workmen's wages.

SMITH (H. S.), ESSIG (E. O.), FAWCETT (H. S.), PETERSON (G. M.), QUAYLE (H. J.), SMITH (R. E.), & TOLLEY (H. R.). **The efficacy and economic effects of plant quarantines in California.**— *California Agric. Exper. Stat. Bull.* 553, 276 pp., 1933.

In this report of a committee appointed by the Dean of the College of Agriculture, University of California, to study the numerous problems involved in the application of the plant quarantine system in the State, the subject is fully discussed under its biological, economic, and administrative aspects.

Among the biological considerations are the geographical distribution of plants, pests and diseases; the probability of introduction of viable pests and diseases; and the relation between the introduction and establishment of pests and diseases. Economic factors influencing the trend of quarantine policy include the effect of pests and quarantines on total income and on its distribution among individuals and groups; the effect of changing volume and quality of products; the financial results of excluding plant pests and diseases as compared with that of excluding certain commodities; and the costs of combating pests and diseases at present in California. Under administrative aspects are comprised the need for exchange of agricultural commodities; systems of plant quarantine; the topographical and climatic features of California in relation to quarantine; a brief history of plant quarantine in California; the administration of State quarantines; and an analysis of the plant quarantines administered for the protection of California agriculture, including those against peach yellows and rosette, white pine blister rust (*Cronartium ribicola*), flag smut of wheat (*Urocystis tritici*), citrus melanose (*Diaporthe citri*) [*R.A.M.*, xiii, p. 26], citrus canker (*Bacterium* [*Pseudomonas*] *citri*), cotton, Texas, or *Ozonium* root rot (*Ozonium* [*Phymatotrichum*] *omnivorum*), chestnut bark disease (*Endothia parasitica*), potato wart (*Chrysophlyctis endobiotica*) [*Synchytrium endobioticum*], Woodgate rust of pines (*Peridermium* sp.) [ibid., xii, p. 733], hop downy mildew (*Pseudoperonospora humuli*), phony peach [ibid., xiii, p. 38], maize diseases (*Peronospora maydis* [*Sclerospora* spp.: ibid., xi, p. 546], *Physoderma zeae-maydis*, and *P. maydis*), rice diseases (*S. macrocarpa*, *Entyloma oryzae*, *Oospora oryztorum*, and *Melanomma glumarum*) [ibid., xii, p. 464], bamboo smut (*Ustilago shiraiana*) [ibid., iii, p. 751], and filbert blight (*Cryptosporella anomala*) [ibid., x, p. 347].

For the fiscal year ending 30th June, 1931, the cost of plant quarantine enforcement in California amounted to $388,144, of which the United States Department of Agriculture contributed $16,342.